

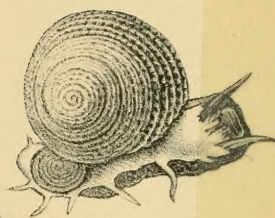
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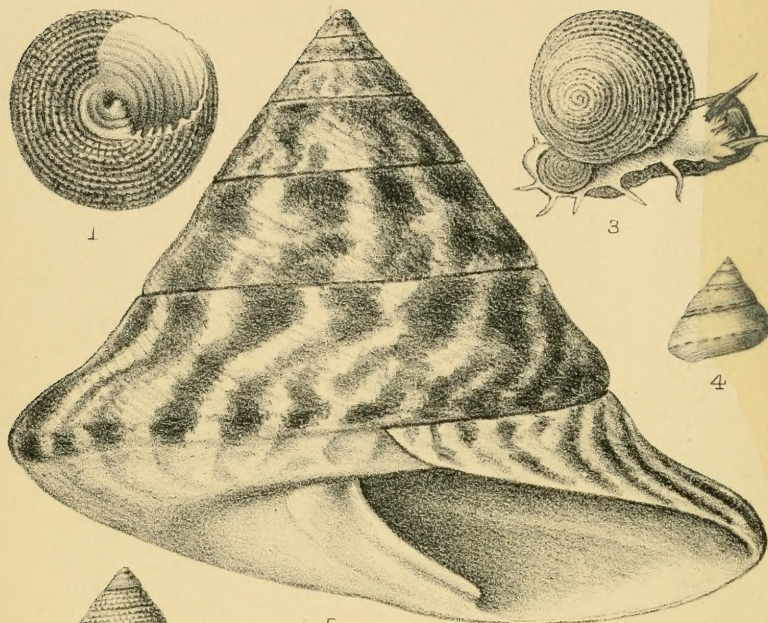
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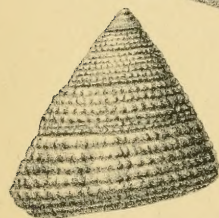
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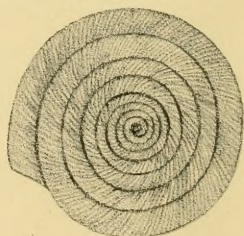
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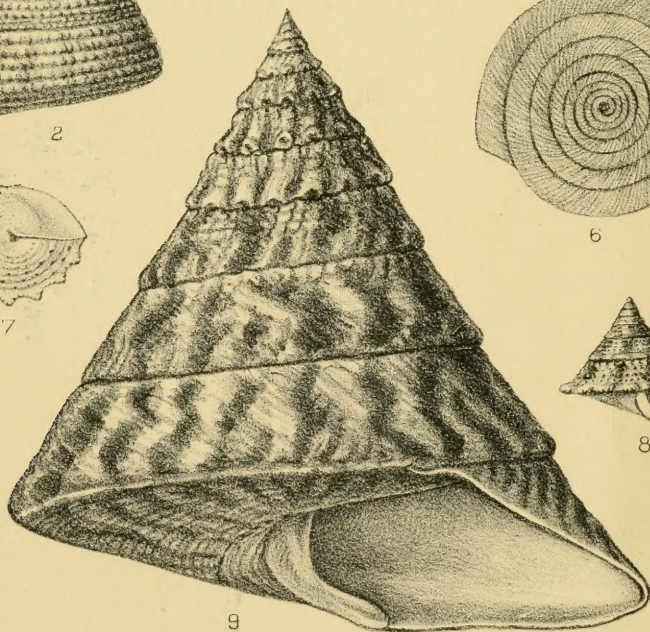
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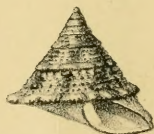
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MANUAL
OF
CONCHOLOGY;

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONTINUED BY

HENRY A. PILSBRY.

Vol. XI.

TROCHIDÆ, STOMATHIDÆ, PLEUROTOMARIIDÆ, HALIOTIDÆ.


PHILADELPHIA:

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1889.





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The Editor desires to express his sincere thanks to the subscribers to the *MANUAL OF CONCHOLOGY* for their continued patronage, and for the many kind expressions of interest in the continuation of the work which he has received.

The introduction in the present volume of full synonymic references into the text of the work, and the practice of giving descriptions extending to every character shown by each species, are innovations which the author trusts will lighten the labor of those who have occasion to consult the *MANUAL*.

All descriptions which are not drawn from specimens are followed by the authority from whom they are taken, in parenthesis. This acknowledgement serves also to indicate the species lacking in the Academy's collection, and shows the amount of material upon which the present work is based.

H. A. P.

March, 1889.

La détermination précise des espèces et de leurs caractères distinctifs, fait la première base sur laquelle toutes les recherches de l'Histoire naturelle doivent être fondées ; les observations les plus curieuses, les vues les plus nouvelles, perdent presque tout leur mérite, quand elles sont dépourvues de cet appui, et malgré l'aridité de ce genre de travail, c'est par là que doivent commencer tous ceux qui se proposent d'arriver à des résultats solides. CUVIER.



MANUAL OF CONCHOLOGY.

FAMILY *TROCHIDÆ*.

Animal similar in general form to the Turbinidæ. Epipodial line bearing one, several, or many smooth or ciliated cirrhi on each side; head with a short, broad rostrum; intertentacular lobes simple or digitated, separate or united across the front, sometimes obsolete. Jaws developed or absent. Radula rhipidoglossate, rhachidian teeth always present and well-developed; lateral teeth generally 5 on each side, sometimes more numerous; marginal teeth narrow, very numerous.

Shell nacreous within, conical, pyramidal, subglobose, turbinate or helicoid; aperture entire, tetragonal or rounded; peristome generally not continuous. Operculum circular, thin, entirely corneous, formed of numerous gradually increasing whorls, nucleus central.

The Trochidæ are like the Turbinidæ in the possession of a nacreous test and in the principal structural characters of the animal. They differ from that family in having a corneous, never calcareous, operculum, which is always multispiral.

The family is represented by numerous littoral species on nearly all coasts, and numbers also many deep sea forms.

Since very early times many species have been well-known to naturalists. The name *Trochus*, according to Fischer was used for the first time by Rondelet, in 1558, who assembles under this title a rather miscellaneous assortment of univalves, including a true Trochus. Linnæus' genus *Trochus* is composed principally of true Trochidæ, but contains also species of several very different families. Lamarck still further restricted the group by eliminating several genera; and in more recent times the labors of Gray, H. and A. Adams and others, have contributed much toward a systematic arrangement of the family.

The more extensive works upon the Trochidæ are the following.

A. ADAMS.

Contributions toward a Monograph of the Trochidæ, in Proc. Zool. Soc., 1851, pp. 150-192.

DR. P. FISCHER.

Monog. Genre Troque, in Kiener's Coquilles Vivantes, Paris, 1880.

R. A. PHILIPPI.

Monograph of Trochus in Syst. Conchylien Cabinet, ed. 2 (1846 to about 1856).

LOVELL REEVE.

In Conchologia Iconica vol. xiii. (1861.)

Adams' monograph contributes numerous descriptions of supposed new forms, without figures, measurements or comparison with known species. The work as a whole is an unmitigated nuisance. Philippi's monograph describes scores of "species" founded upon coloration or other equally trivial characters. His descriptions are generally very good, and the figures assist one to identify most of the forms. Reeves' work is very incomplete. The monograph by Fischer is an altogether thorough and reliable work.

The primary division of the Trochidæ is attended with considerable difficulty. I have adopted the following four

Subfamilies.

TROCHININÆ. Animal with frontal lobes; jaws wanting; lateral teeth never more than 5 on each side of the rhachidian, or sometimes with an obsolete sixth tooth. Shell pearly; peristome incomplete.

GIBBULINÆ. Frontal lobes present; jaws present; lateral teeth frequently exceeding 5 on each side. Shell pearly; peristome incomplete.

UMBONINÆ. Rostrum short, rounded, with lateral beards; eyes on long peduncles; tentacles subulate, the left attached to a siphon-shaped frontal appendage; mantle reflexed over the edge of the aperture; jaws present; lateral teeth 6 on each side. Shell polished, scarcely pearly, peristome incomplete.

DELPHINULINÆ. No frontal lobes; jaws present. Shell pearly inside; aperture circular, peristome continuous.

Synopsis of Genera and minor groups.

Subfamily I. TROCHININÆ.

Genus TROCHUS Linné.

Shell conical, strong, imperforate or false-umbilicated, the axis always solid, the spire more or less elevated, whorls numerous,

generally carinated at the periphery, sometimes rounded, more or less flattened beneath; aperture rhomboidal, very oblique; columella twisted, its edge generally folded or dentate, generally toothed at base; sculptured usually with spiral beaded ridges. The species are all old world in distribution.

Subgenus *TROCHUS*, (*sensu stricto*.)

Shell large, thick, solid, the spire pyramidal or conical, periphery angulated, base flat or convex; outer and basal lips smooth within, the columella with a strong fold above, ending in an obtuse tooth below. *T. niloticus* L., etc.

Subgenus *CARDINALIA* Gray, 1857.

Shell conical; base plano-concave, without false-umbilicus; outer lip smooth within; columella short, arcuate, simple, without a fold above, ending below in an acute denticle.

Indo-Pacific Province.

Subgenus *TECTUS* Montfort, 1810.

Shell pyramidal; base flat, without false-umbilicus; aperture rhomboidal, very oblique, angular, wider than long; outer lip lirate within; columella very short, vertical, with a strong spiral fold, ending anteriorly in a knob or point. Type, *T. mauritanus* Gmel.

Indo-Pacific Province.

Subgenus *INFUNDIBULUM* Montfort, 1810.

Shell conical, false-umbilicate; columella more or less folded above, its edge straight, oblique, toothed or simple, with or without a tooth at base. Type, *T. concavus* Gmel.

Indo-Pacific and Australasian Province.

Section *LAMPROSTOMA* Swainson, 1840.

Shell conical with nearly flat base and angular periphery; all over granose-lirate; columella tortuous above, its edge denticulate; basal and outer margins of aperture generally lirate within. Type, *T. maculatus* Linn.

Section *INFUNDIBULUM* (*sensu str.*).

Shell conical, periphery angular, base nearly flat, or concave; outer surface smooth, costate or granular; outer lip not lirate within; columella inserted in the center of the axis, strongly folded above, its edge smooth, not toothed nor notched at base. Type, *T. concavus* Gmel.

Section INFUNDIBULOPS Pilsbry.

Similar to Infundibulum, but the columella thin straight and simple from its insertion in the center of the false-umbilicus to its union with the basal lip. Type, *T. erythræus* Broce.

Indian O.

Differs from Infundibulum in lacking the strong fold of the columella.

Section CÆLOTROCHUS Fischer.

Similar to Infundibulops, but with the false-umbilicus very deep and narrow, penetrating deeper than the columella which is inserted upon its edge, not in the center of the axis. Type, *T. tiaratus* Q. et G.

New Zealand.

Section ANTHORA Gray.

Shell elevated, conical, granulose above, lirate below; base plano-concave, false-umbilicus shallow, bicostate, outer and basal lips smooth within, columella oblique, with a small fold above, its edge simple. Type, *T. viridis* Gmel.

New Zealand.

Section PRÆCIA Gray.

Columella twisted, simple; false-umbilicus deep, narrow, with a distinct narrow central spiral rib; throat striated. Type, *T. elegantulus* Wood.

Section BELANGERIA Fischer.

Shell conical, solid; outer lip of aperture lirate within; columella with a small fold above, its base curving and denticulate where it unites with the denticulate basal margin; false umbilicus narrow, Type, *T. scabrosus* Phil.

Subgenus CLANCULUS Montfort, 1810.

Shell conical, conoidal or turbate; generally granose-lirate all over; periphery rounded or angular, base flat or convex, false-umbilicate; aperture oblique, usually obstructed by teeth, the outer lip usually lirate or dentate within, columella with a tooth-like fold above, terminating in a tooth at the base; false umbilicus with a crenated border. Type, *T. pharaonius* Linn.

Mediterranean, Indian O., and Pacific.

Genus MONODONTA Lamarek, 1799.

Shell imperforate, turbate, ovate or globose-depressed, the periphery rounded; surface smooth or spirally ridged; columella

simple, arcuate and spread upon the base at its insertion, below tuberculate, swollen, ending in a tooth, or simple; outer lip smooth or lirate within.

Subgenus MONODONTA Lam.

Shell turbate-conic, very heavy, thick, solid; columella strong, cylindrical, bulging or more or less toothed near or at the base; aperture as high as wide.

Section MONODONTA (restricted).

Shell smooth or spirally ridged; outer lip plicate within; columella short porcellaneous, terminating abruptly in a tooth, between which and the basal margin there is a square notch or channel. Type, *M. labio* L. *Indian O.*

Section AUSTROCOCHLEA Fischer.

Shell like *Monodonta s. str.*, but columella only slightly toothed at the base, not notched; outer lip lirate within. Type, *M. constricta* Lam. *Australasia.*

Section OSILINUS Philippi.

Shell smooth or obsoletely spirally grooved; outer lip smooth within; columella swollen and convex in the middle, pearly, continuous below with the basal lip. Type, *M. turbinata* Born.

Mediterranean Sea.

Subgenus DILOMA Philippi.

Shell globose or depressed-conic; aperture large, very oblique; columella not prominent, flattened, not cylindrical, generally concave, arcuate, and slightly denticulate at the base or smooth.

Section DILOMA (restricted).

Shell globose, depressed or conic, imperforate, black; smooth or spirally grooved; columella wide, concave, porcellaneous; lip margined with an iridescent band which extends across the parietal wall. Type, *M. nigerrima* (Gmel.) Phil.

W. Coast S. America.

Section NEODILOMA Fischer.

Similar to the preceding, but without the parietal band of iridescent nacre; surface smooth, grooved or lirate; unicolored, spotted or tessellated; columella with one or two denticles at base, or smooth. Type, *M. aethiops* Gmel. *Australasia.*

Section CHLORODILOMA Pilsbry.

Shell like Diloma but rather more conical, less nacreous; coloration, variegated, consisting of fine lines of dark on a lighter ground; columella generally green; umbilicus perforate or subperforate. Type, *M. crinita* Phil. *Australasia.*

Section OXYSTELE Philippi.

Shell depressed conical, dark or variegated in color; aperture large, oblique; columella concave, arcuate, thin-edged, perfectly simple and curved below, above spread over the umbilical area as a rounded, well-defined pad of callus. Type, *M. merula* Lam. *S. Africa; Japan.*

Genus CANTHARIDUS Montfort, 1810.

Shell ovate-conic or pyramidal imperforate, smooth or spirally sculptured outside, brilliantly iridescent within; colors generally bright and variegated; aperture less than half the length of shell, longer than wide, ovate; columella usually more or less folded or toothed near the base. *Australasian Seas.*

Subgenus CANTHARIDUS Montfort.

Section CANTHARIDUS (restricted.)

Shell rather thin, ovate-pointed, whorls striated, or smooth; columella rather straight, simple, not toothed. Type, *C. iris* Chem.

Section PHASIANOTROCHUS Fischer.

Shell thick, solid, polished, elongated; ovate-pointed; aperture ovate, longer than broad; columella arcuate, bearing usually a tooth-like projection in the middle. Type, *C. badius* Wood.

Subgenus BANKIVIA Beck, 1848.

Shell imperforate, elongated, narrow, conical, thin, but slightly pearly; aperture small, about one-third the length of shell; columella slightly twisted, subtruncated toward the base. Type, *C. varians* Beck.

Section LEIOPYRGA H. & A. Adams.

Shell perforate, elongated, narrow, somewhat turritid, thin, the whorls convex, rounded or carinated; aperture oval, small, columella arcuate, not truncated at base. Type, *C. picturata* Ad.

Subgenus THALOTIA Gray, 1840.

Shell imperforate, elevated-conical, thick, solid, granulated or spirally ribbed; periphery rounded or obtusely angular; aperture

small, ovate, outer lip thick, crenulated within; columella toothed at base, subtruncated. Type, *C. conicus* Gray.

Section ODONTOTROCHUS Fischer.

Shell conical, elevated; periphery acutely carinated; columella toothed below, truncated. Type, *C. chlorostomus* Mke.

Genus GAZA Watson, 1878.

Shell trochiform, nacreous both on the surface and throughout; delicately sculptured, with a reversed lip thickened internally by a nacreous callus; the pillar twisted direct, in front angulated and pointed, behind entirely parted from the lip, and in the umbilical region spread out in a nacreous pad. (*Watson*) Type, *G. dædala* Watson. *Fiji Is.*

Subgenus MICROGAZA Dall, 1881.

Shell flattened, rotelliform, resembling a *Gaza* without reflected lip or umbilical callus, brilliantly nacreous when fresh, and having a distinctly scalariform umbilicus. (*Dall*) Type, *M. rotella* Dall. *Barbados.*

Genus CALLOGAZA Dall, 1881.

Shell resembling *Gaza* Watson, but with the umbilical pad reflected only partly over the umbilicus; the pillar straight, passing without notch or mucronation into the reflected basal margin of the aperture; nacreous layer in this shell covered with a thin non-nacreous layer, which appears to be covered by a delicate epidermis. (*Dall*) Type, *C. superba* Dall.

Genus BEMBIX Watson, 1878.

Shell conical, high, carinated, tumid on the base, umbilicated, thin, nacreous, covered with a thin membranaceous epidermis. (*Watson*) Type, *B. æola*. *Japan.*

Genus CHLOROSTOMA Swainson, 1840.

Shell conical, umbilicate or imperforate, solid; spire elevated or depressed; aperture oblique, subrhomboidal, the outer lip smooth within; columella arcuate, above continued in a callus over or half-way around the umbilicus, which when open shows one or more spiral ribs inside; base of columella with two or more denticles. Type, *C. argyrostomum* Gmel.

Chinese and Japanese Seas, W. Coast America, West Indies.

Subfamily II. GIBBULINÆ.

Genus GIBBULA Risso, 1826.

Shell usually perforate or umbilicate, conical, the spire moderately elevated; whorls often gibbous or tuberculose beneath the sutures, smooth or spirally ribbed; the last generally angular at the periphery; aperture subrhomboidal; columella oblique, dentate or subsinuous at base; outer lip acute. Type *G. magus* L.

Subgenus GIBBULA (restricted.)

Section GIBBULA.

Shell nodulous or tumid beneath the sutures, spire elevated, umbilicated or imperforate, generally conspicuously painted with longitudinal stripes of red or brown.

European and Australian Seas; Indian O.; Red Sea.

Section EURYTROCHUS Fischer.

Shell small, spirally lirate, depressed, umbilicate; last whorl deflected toward the aperture; aperture oblique rounded-quadrangular, the terminations of the lips approaching, connected by a callus; outer and basal lips crenulated within. Type, *G. danieli* Crosse.

Oceanica.

Section CALLIOTROCHUS Fischer.

Shell minute, turbinate, shining, narrowly perforated; whorls convex; aperture subcircular. Type, *G. phasianellus* Desh.

Indian O.

Subgenus MONILEA Swainson, 1840.

Shell solid, depressed-conical, sharply striate and spirally lirate, umbilicated, the umbilicus partly filled by a prominent spiral funicle within it which terminates at the columella; outer lip lirate within; columella sinuous, terminating in a point or denticle at base. Type, *G. callifera* Lam.

Oceanica.

Section SOLANDERIA Fischer.

Umbilicus narrow, columella arcuate, obliquely plicate, terminating in a strong anterior tooth. *G. nucleus* Phil.

Subgenus APHANOTROCHUS Von Martens, 1880.

Shell conical, perforated; columella with finely denticulated edge; outer lip lirate within. Type, *G. obscurus* Wood.

Indian Ocean.

Subgenus ENIDA A. Adams, 1860.

Shell depressed-conical, widely umbilicate, whorls convex, concentrically granose-lirate, sutures canaliculate, last whorl carinated or angulated; aperture subquadrate; outer lip simple, or lirate within; inner lip reflexed; umbilicus large, margin crenulated. Type, *E. japonica* A. Ad. *Japan.*

Genus MINOLIA A. Adams, 1860.

Shell widely umbilicated, delicate, thin, smooth; whorls rounded; spire depressed; aperture circular, the outer lip and columella thin, simple, acute; umbilicus without an internal funicle or rib. Type, *M. punctata* Ad. *Oceanica.*

Genus CIRCULUS Jeffreys, 1865.

Shell minute, widely umbilicated, thin, with spiral striæ; whorls rounded; spire depressed; aperture rounded-quadrate, the columella and outer lips thin, simple, acute. Type, *C. striatus* Phil. *European Seas.*

Genus TROCHISCUS Sowerby, 1838.

Shell large, orbicular, umbilicated, solid, depressed, smooth; spire low-conical, formed of rapidly widening flattened whorls; aperture subquadrangular, outer lip acute, sinuous, columella simple, somewhat sinuous. Type, *T. norrisii* Sowb. *California.*

Genus LIVONA Gray, 1842.

Shell large, turbinate, thick, solid, umbilicate, whorls rounded; aperture rounded-quadrangular, smooth and silvery within; outer lip acute; columella arcuate, simple, spreading half around and partly over the umbilicus in a white callus which is deeply notched in the middle. Type, *L. pica* L.

Genus PHOTINULA H. & A. Adams, 1854

Shell imperforate, orbicular, depressed, rather thin, whorls rounded, smooth or spirally striated; aperture wider than long, outer lip acute, columella spreading in a callus pad at its insertion, simple at base. Type, *P. cœrulescens* King. *Southern Seas.*

Genus MARGARITA (Leach) Auct.

Shell umbilicate, obicular, conoidal or depressed, thin; not variegated; whorls rounded, smooth or spirally lirate; aperture sub-

circular, peristome simple, acute, the margins approaching; columella arcuate, simple, thin. Type, *M. helicina* Fab.

Arctic and Subarctic Seas.

Subgenus BATHYMOPHILA Dall, 1882.

Shell when immature like *Margarita*; adult with a broad flattened columella, which has a blunt tooth, rough or granulated, at its end. Type, *M. euspira* Dall.

Genus SOLARIELLA Searles Wood. 1842.

Shell umbilicated, conical; whorls with spiral granose liræ; umbilicus with carinated margin. Type, *S. maculatum* Wood.

Subgenus TURCICULA Dall, 1881.

Shell globosely conical, white, thin; umbilicus reduced to a chink under the thin callus of the upper part of the pillar lip; mouth rounded rectangular, margins all thin; columella concave; outer surface with tuberculose ridges. Type, *M. imperialis* Dall. *Cuba*. (This group is placed under *Calliostoma* by Fischer. Its position is problematical until the structural details are known.)

Genus CALLIOSTOMA Swainson, 1840.

Shell imperforate or rarely umbilicate, conical, rather thin; whorls smooth, spirally ridged or granular, the last angulated at the periphery; aperture quadrangular; columella simple, usually ending anteriorly in a slight tooth. Type, *C. ziziphinum* L.

Subgenus CALLIOSTOMA (restricted.)

Axis imperforate, its lower termination covered by a slight expansion of the columella. The sections of this subgenus are given in the text.

Subgenus EUTROCHUS A. Adams, 1863.

Shell umbilicated; columella ending in a point or tooth below. Type, *C. javanicus* Lam.

Genus TURCICA H. and A. Adams, 1854.

Shell conoidal, thin, subdiaphanous, imperforate; whorls with transverse series of granules, the last rounded on the periphery; columella thick, spirally twisted posteriorly, ending anteriorly in an obtuse, prominent point; outer lip thin, simple, acute (*H. & A. Ad.*) Type, *T. monilifera* A. Ad. *Australia.*

Genus BASILISSA Watson, 1879.

Shell conical, carinated, umbilicated, nacreous; last whorl sinuated above; pillar straight, but slightly oblique, thin, hollowed out above, hardly toothed in front, but strongly angulated at base; mouth rhomboidal, terminations of peristome not approaching nor connected by a callus. Type, *B. lampra* Watson.

N. Pacific O.

Genus EUCHELUS Philippi, 1847.

Shell globose-turbinate, umbilicate or imperforate; whorls rounded, spirally granose lirate; aperture subcircular, outer lip thick, crenulate within, columella with a tooth or a notch at the base; operculum with few whorls. Type, *E. atratus* Gmel.

Indian and Pacific Oceans.

Subgenus OLIVIA Cantraine, 1835.

Shell conoidal, imperforate, whorls rounded, cancellated; aperture rounded, lirate within, the lip with a strong varix outside; columella sinuous, terminating in a strong truncate tooth at base. Type, *O. tinei* Cate.

Mediterranean.

Subgenus PERRINIA H. and A. Adams, 1854.

Shell trochiform, imperforate, whorls flattened, cancellated; aperture quadrangular, outer lip lirate within, columella short, nearly straight, with several tubercles near the base. Type, *P. anguliferus* A. Ad.

The position of this group is problematical.

Subfamily III, DELPHINULINÆ.

(See MANUAL OF CONCHOLOGY, x, p. 266.)

Subfamily IV, UMBONIINÆ.

Genus UMBONIUM Link, 1807.

Shell with a very thin pearly layer inside, orbicular, depressed, imperforated, whorls flattened above, bright, smooth or spirally grooved; aperture wider than high, outer lip thin, acute; umbilical tract covered by a heavy pad of callus. Type, *U. vestiarium* Linn.

Indian and Pacific Oceans.

Genus ETHALIA H. and A. Adams, 1854.

Shell orbicular, turbinate depressed; whorls convex, smooth or transversely striated, the last rounded at the periphery; umbilicus

partly closed by a callus deposit; columellar lip ending anteriorly in an obtuse dilated callus. Type, *E. guamense*, Q. et G.

Genus *ISANDA* H. and A. Adams, 1854.

Shell orbicular-conoidal, polished; aperture longer than wide, subquadrate; umbilicus open, perspective, the margin crenulated. Type, *I. coronata* A. Ad.

Genus *CAMITIA* Gray, 1847.

Shell orbicular, depressed, smooth, polished; axis imperforate; columella spirally twisted above, forming a false-umbilicus, with the margin simple; columella with the edge edentulate and ending in a point. Type, *C. pulcherrima* Gray.

China, Japan.

Genus *UMBONELLA* A. Adams, 1863.

Shell globose-conoid, solid, porcellaneous, polished, narrowly umbilicate; aperture subquadrate, lip simple, dilated anteriorly; umbilicus narrow, margin crenate rugose. Type, *U. murrea* Reeve.

Japan.

Genus *CHRYSTOSTOMA* Swainson, 1840.

Shell globose, solid, thick, spire very short; aperture rounded, the parietal wall bearing a heavy callus which wholly or almost covers the narrow umbilicus. Type, *C. paradoxum* Born.

Genus *TROCHUS* Linn., 1758.

Trochus LINN., *Syst. Nat.*, x, p. 756.—*Pyramidea* SWAINSON, *Mulacology*, p. 350.—*Rochia* GRAY, *Guide Syst. dist. Moll. Brit. Mus.*, p. 148. (1857.)

Animal with 1 to 4 pairs of cirrhi upon the epipodial line, which are not ciliated; frontal lobes between the tentacles simple or foliated, distinct or united into a vail. The formula of teeth is $\infty . 5 . 1 . 5 . \infty$ or $\infty . 1 + 5 . 1 . 5 + 1 . \infty$.

The central and lateral teeth have more or less expanded lateral margins, and bear cusps which are smooth on the cutting edge, with minute denticles one or several in number at the sides. There is frequently a narrow oblong plate, without cusp, lying between the 5th lateral and the inner marginal tooth, usually more or less concealed by the expanded outer margin or supporting-wing of the 5th lateral. This seems to me to be a rudimentary or rather, *degenerate* lateral tooth; not the inner marginal tooth, as Dr. Troschel and

others have held. The reduction in number of the teeth in Trochidae appears to proceed by the loss of the *outer laterals*, never by obsolescence of teeth in the central portion of the radula. (Compare the related family Turbinidae, where the rule is specialization of the radula by the loss of the central tooth, as in *Orthomesus*, or by the loss of its cusp, as in *Bolma*, *Cookia* and *Pomaulax*; in the last group the inner lateral also has lost its cusp. *Vide* MANUAL, vol. x, pp. 163, 187.) Pl. 50, fig. 1, *Trochus niloticus* L.; pl. 50, fig. 2, *T. fenestratus* Gmel.; pl. 50, fig. 3, *T. maculatus*, L.; pl. 50, fig. 4, *T. tiaratus* Q. and G.

The central teeth in all of the subgenera of *Trochus*, including *Clanculus*, differs from those of the following genus, *Mondonta*, in being widest in the middle, tapering toward the cusp and the base; whilst in *Monodonta* and its subgenera the latero-basal angles are prominently produced.

The operculum (pl. 1, f. 6) is circular, corneous, thin, with numerous (8 to 12) narrow whorls, the nucleus central.

Subgenus TROCHUS (*s. str.*)

T. NILOTICUS Linné. Pl. 1, figs 5-8.

Shell large, ponderous, conical, appearing subperforate, covered by a corneous striate, brown or yellowish cuticle usually lost on the upper whorls; color beneath the cuticle white, longitudinally striped with crimson, violet or reddish brown, the base maculate or radiately strigate with a lighter shade of the same; spire strictly conical, apex acute, usually eroded, whorls 8-10, the upper ones tuberculate at the sutures, and spirally beaded, the following flat on their outer surfaces, smooth, separated by linear sutures, the body-whorl expanded, dilated and compressed at the obtuse periphery, more or less convex below, indented at the axis; umbilical tract covered by a spiral pearly deeply entering callus; aperture transverse, very oblique; columella oblique, terminating in a denticle below, and with a strong spiral fold above, deeply inserted into the axis.

Alt. 80-100, diam. 100-120 mill.

Indian Ocean; New Ireland; New Caledonia; North Australia, etc.

Trochus niloticus L., *Syst. nat.* xii, 1767, p. 1227.

Operculum pl. 1 fig. 6, circular, thin, corneous, orange-brown, composed of about 10 whorls.

VAR. MAXIMUS Koch. Pl. 1, fig. 9.

Shell less ponderous than *T. niloticus*; form strictly conical; whorls of the spire decidedly plicate or tuberculate, planulate; body-whorl not dilated at the periphery; base flat, concentrically grooved; columella less oblique than in the type. Alt. 95, diam. 95 mill.

India O.; Cochín-China; Viti Is.

T. maximus Koch, in Philippi, *Abbild. u. Beschreib., Trochus*, t. iv, f. 3. 1844.—*T. marmoratus* Kiener, *Sp. et Icon.*, t. 11.—*T. niloticus* Rve., *Conch. Icon.*, f. 3.

T. maximus is an arrested or primitive form of *niloticus*. In the conic form, flat, lirate base, and sculptured spire, it exactly resembles an immature specimen of the latter species; but at the same time, it retains these characters in adult individuals. I do not know whether both occur in the same locality; if they do, I would incline to consider them distinct. The finest suite I have seen of the *T. maximus* is from the Viti Is., collected by the late ANDREW GARRETT.

Since the above was written I have seen a discussion of these two forms by Dr. VON MARTENS (*Ann. and Mag. N. H.*, 1869, p. 97.) *T. maximus* is considered distinct from *niloticus*, and the differences indicated by this distinguished zoölogist.

T. ACUTANGULUS Chemnitz. Pl. 2, fig. 10.

Shell conic-pyramidal, axis imperforate but appearing sub-umbilicate, solid, thick, white, longitudinally flammulate with bright red; spire conic, apex acute, whorls 10, spirally encircled by numerous (about 10 on upper surface) beaded liræ, which are separated by superficial interstices; above the sutures there is a series of short folds or knobs which usually become obsolescent upon the periphery of last whorl; body-whorl obtuse at the periphery, nearly flat below, indented around the false umbilicus, obsoletely concentrically lirate, the liræ about 9 in number, red and white articulated, interstices white; aperture transversely rhomboidal, somewhat rounded; columella nearly vertically descending, subdentate at base, above with a profoundly entering spiral fold; parietal wall bearing a heavy transparent callus, which is excavated around the axis.

Alt. 55–70, diam. 45–60 mill.

East Indies; Philippines; N. Australia.

Trochus acutangulus Chemnitz, *Conch. Cab.*, v, p. 81, t. 167, f. 1710. 1781.—*T. conus* Gmel., *Syst. Nat.*, xiii, p. 3569. (1788)—*T. elatus* Lam., *An. sans Vert.*, vii, p. 21. 1822.—*T. altus* Perry, *Conchology*, t. 47, f. 3, (1811)—*T. turris* Phil. *Zeitsch. f. Mal.*, 1846, p.

102,—*T. altus* Phil. *Conch. Cab.* ii, p. 217, t. 32, f. 7.—*T. senatorius* Phil., *Conch. Cab.* ii, p. 324, t. 46, f. 7.

The *T. altus* of Philippi is doubtfully placed here. It has more acutely carinated periphery than any actangulus I have seen. I have copied Philippi's figure on Pl. 9, fig. 96. This species is the type of Gray's group *Rochia*.

Subgenus CARDINALIA, Gray, 1840.

T. VIRGATUS Gmelin. Pl. 5, figs. 43, 44.

Shell imperforate, conic-pyramidal, solid, white, above longitudinally broadly flammulated with red; spire somewhat attenuated and concave on its upper portion, then slightly convex, the sutures linear, whorls nearly planulate, apex acute; sculpture of spire consisting of spiral prominently beaded liræ, about eight on each whorl; whorls 10, the last carinated at the periphery; base plano-concave, indented in the center, finely, densely lirate, the liræ minutely beaded, red, articulated with white, the interstitial furrows white; aperture subrhomboidal, denticulate within the base; columella short, oblique, ending in a tubercle below, simply entering, not plicate, above, Alt. 45, diam. 40 mill.

Indian O.; Red Sea.

T. virgatus GMEL., *Syst. Nat.*, xiii, p. 3580.—PHILIPPI, *Conchyl. Cab.*, p. 4, t. 1, f. 4, 5.—REEVE, *Conch. Icon.*, f. 69.—FISCHER, *Coq. Viv.*, p. 97, t. 27, f. 1; t. 28, f. 1.

The plano-concave finely lirate base, simple columella and toothless aperture at once separate this species from other Trochids.

Subgenus TECTUS Montfort, 1810.

Tectus MONTF., *Conch. Syst.* i, p. 187.—*Pyramis* SCHUMACHER, *Essai d'un nouv. Syst. Vers test.*, p. 232, (1817.)

T. OBELISCUS Gmelin. Pl. 2, figs. 13, 14.

Shell imperforate, solid, thick, strictly conical, the spire more or less attenuated above, the apex acute; color yellowish or grayish, more or less mottled and marbled with green or brown, base white, green or brown; whorls 12–14, the upper ones slightly exserted and plicate, tuberculate or undulating at the sutures, the folds or tubercles obsolete on the lower whorls; upper whorls encircled with one or two spiral series of small tubercles or beads, which are increased to about five series on the middle whorls; last whorl beaded, but smoother than the preceding, or radiately finely wrinkled, or nearly

smooth, angulate at the periphery; base flat, concentrically lirate, the ribs smooth, wide, separated by shallow grooves, obsolete toward the outer margin; aperture transverse, very oblique, subtriangular, the outer wall grooved within, the basal margin straight, not concave in the middle, deeply notched at its junction with the columella, sculpture inside with revolving acute plicæ, corresponding to the liræ which revolve around the central area outside; columella very short, with a very strong acutely carinated spiral fold.

Alt. 75, diam. 75 mill.

Indian and Pacific Oceans; Samoan, Viti and Philippine Is., New Caledonia; N. Australia, etc. Singapore (Archer.)

T. obeliscus GMEL., *Syst. Nat.*, xiii, p. 3579, 1788.—*T. pyramis* BORN, *Test. Mus. Cæs.*, 1780.—*T. pyramis* PHIL., *Conchyl. Cab.* p. 2—Reeve, *Conch. Icon.*, f. 8.—*T. acutus* LAM., *An. sans Vert.*, 1822, vii, p. 23.—*T. tabidus* REEVE, *Conch. Icon.*, f. 74.

I believe that this is the *T. pyramis* of Born; but since there is some doubt about it, I have followed the precedent of Dr. Fischer in adopting Gmelin's name. *T. acutus* Lam. is an immature individual. (pl. 2 fig. 13).

Var. *CÆRULESCENS* Lamarck. Pl. 4, fig. 26.

Form more slender than in the type; spiral beading sub-obsolete; color dark greenish, obliquely strigate with brown; base green, brown or yellowish; outer wall of aperture (in the specimens I have seen) not grooved within; other characters as in the type.

T. cœrulescens Lamarck, *An. sans Vert.*, vii, 1822, p. 18.—*T. prasinus* Menke, *Moll. Nov. Holl. Spec.*, p. 16, 1843.

Var. *TABIDUS* Reeve. Pl. 43, fig. 1.

Whorls obliquely irregularly wrinkled, tubercled toward the apex; base obsoletely grooved. *Australia* (Reeve).

T. DENTATUS Forskal. Pl. 3, fig. 23.

Shell large, imperforate, conic-turreted, solid, heavy, grayish pink, but unicolored and dull; whorls about 12, planulate, more or less obviously finely radiately wrinkled, often showing a few spiral rows of beads, finely, very obliquely striate, but all this surface sculpture often obsolescent; periphery of whorls and at the sutures armed with distant strong radiating solid knobs, about six to ten on the last whorl; base flat, smooth, partly polished, with an appearance of obsolete concentric liræ about the central portion, white, or with a zone of blue or of green or both colors surrounding the axial tract;

aperture transverse, rather wide, rhomboidal, the basal margin regularly curved, 6 to 8 plicate within near the columellar termination; columella very short, the fold stout, heavy, directed downward.

Alt. 80, diam. 70, mill.

Red Sea; Persian Gulf.

Trochus dentatus Forskal, *Descr. Animalium*, p. 125, 1775.—*T. pyramidalis* Lamarek, *An. sans Vert.*, vii, 1822, p. 17.—*T. forcatus* Gmelin, *Syst. Nat.* xiii, p. 3580.

T. TRISERIALIS Lamarek. Pl. 4, fig. 30; pl. 3, fig. 20.

Shell turreted-conic, imperforate, solid, heavy, flesh-colored, lighter beneath; whorls about 12, somewhat convex toward the lower, concave toward the upper part, the upper whorls with a single submedian series of rather prominent tubercles, the lower with about four subequal series of small, separated, rather acute tubercles, the surface between them minutely wrinkled; base nearly flat, spirally lirate, the liræ becoming narrow toward the outer edge; aperture rhomboidal, outer and parietal walls more or less lirate within, base with a deep seated spiral fold near the columella within; columella strongly, acutely folded, the fold directed downward.

Alt. 45–50, diam. 35–40 mill.

Philippines.

T. triserialis Lam., *An. sans Vert.*, vii, p. 22, 1822.—*T. acutus* Rve., *Conch. Icon.*, sp. 20, (*non T. acutus* Lam.) (pl. 3, fig. 20.)

T. FABREI Montrouzier. Pl. 3, figs. 21, 22.

Shell imperforate, conic-pyramidal, whitish, with a fulvous epidermis mottled with roseate; whorls about 14, subplanulate, separated by linear, flexuous sutures, obliquely striate, sometimes nodulose above the sutures, with spiral granulose liræ, on the upper whorls three, on the lower four to six in number; last whorl carinated, margined at the suture; base planulate, concentrically lirate, the liræ flat, about 15 in number, the interstices radiately striate; aperture transverse, rhomboidal, the basal margin plicate within; columella short, strongly spirally plicate truncate.

Alt. 50, diam. 37 mill. (*Fischer.*)

Lifou, Loyalty Archipelago; Quaternary of the Isle of Pines, New Caledonian Archipelago.

T. fabrei Montrouzier, *Journ de Conch.*, xxvi, 1878, p. 64, 206.—*Fischer, Coq. Vivantes*, p. 384, t. 116, f. 1, 1a.

Nearly allied to the *T. triserialis*, but differing in the sculpture, which consists of granulose liræ, instead of series of independent pustules. The larger figure is from a fossil example from the Isle of Pines.

T. FENESTRATUS Gmelin. Pl. 4, figs 28, 29.

Imperforate, solid, conic, white or grayish, mottled and maculated with green, brown or olive, base unicolorous, white; apex acute; whorls 9-11, the apical ones smooth by erosion, the following armed around the lower margin with radiating squamose or (on the last whorl) solid tubercles, which are usually laterally compressed on the lower whorls, and number 12 to 20 on the last whorl; entire surface above the periphery covered with fine oblique wrinkles, which are more or less beaded by a few (3 to 5) revolving liræ; base flat, concentrically lirate, the liræ 8 to 14 in number, the outer ones crenulated by fine radiating wrinkles which are continued a short distance inward from the periphery; aperture transverse, the outer and parietal walls lirate within, the base more or less strongly uni-lamellate; columella with a strong downward directed acute fold.

Alt. 30-35, diam. 28-32 mill.

Indian O.; Java; Sooloo Is.; Philippines; Viti Is.; Navigator Is.; New Caledonia, etc.

T. fenestratus GMEL., *Syst. Nat.* xiii, p. 3582, 1788.—*T. circumscutatus* GLD., *U. S. Expl. Exped.*, t. 13, f. 220.—*T. crenulatus* RVE., *Conch. Icon.*, f. 17, (non *T. crenulatus* Lam.)—*T. exaltatus* PHIL., *Conch. Cab.* II, p. 108, t. 17, f. 8.—*T. exaltatus* RVE., *Conch. Icon.*, f. 16.—*T. caparatus* PHILIPPI, *Conchyl. Cab.*, p. 107, t. 17, f. 7.

A variable form, which, however may be readily recognized by the sutural knobs and secondary sculpture of fine wrinkles above, and by the crenulated or beaded liræ around the outer edge of the base.

T. NODULIFERUS Lamarck. Pl. 3, figs 18, 19.

Shell large, ponderous, solid, imperforate, conic; whorls about 12, planulate above, prominently knobbed around the sutures and periphery, the tubercles about fifteen in number on the last whorl; there is usually visible a secondary sculpture of fine subobsolete radiating wrinkles; base flat, very obsoletely lirate, smooth, polished, white or tinged with green around the central portion; aperture smooth within; columellar fold strong, heavy, directed downward; color pinkish, more or less mottled with rose; old specimens uniform grayish. Alt. 70, diam. 75 mill.

Red Sea (Forsk.); Philippines.

T. noduliferus LAM., *An. sans Vert.*, vii, p. 18, 1822.—*T. forskali* (Bolt.) MORCH, *Cat. Yoldi*, p. 158.—*T. dentatus* (in part) PHILIPPI, *Conch. Cab.* II, p. 7.

The figure given by Reeve, (f. 18) differs from specimens from the Philippines before me in having the nodes vaulted on the lower whorl. Upon all the specimens I have seen, the upper nodes only are vaulted, the lower ones are solid, as in the following species.

From *T. dentatus*, the greater number and smaller size of the peripheral tubercles with separate this species. The proportions are different, too; *noduliferus* being broader at the base.

T. MAURITIANUS Gmelin. Pl. 4, figs. 24, 25, 27; pl. 2, figs. 11, 12.

Shell imperforate, conical, solid, marbled and maculated with green, brown and rose-color on a whitish ground; whorls 10-12, planulate, bearing vaulted or solid tubercles which project at the sutures and upon the periphery of the last whorl, where they number about 16; whorls covered with oblique small folds, so interrupted as to appear more or less in spiral series; base flat, white and yellowish, unicolored, all over concentrically lirate, the liræ smooth, narrow, separated by shallow grooves as wide or wider than the ridges, and continuous within the aperture upon the parietal wall; aperture transverse, the outer wall lirate within, the basal margin straight, bearing, within, a strong acute revolving lamella, opposite to a similar but smaller one upon the parietal wall; columella short, with a very strong acute median spiral fold.

Alt. 40-60, diam. 40-55 mill.

Indian O., Madagascar, Seychelles, Red Sea (Jonas) Philippines.

T. mauritanus GMEL., *Syst. Nat.*, xiii, p. 3582, 1788.—*Tectus pagodalis* MONTFORT, *Conch. Syst.* ii, p. 187, 1810.—*T. costifer* JONAS, *Zeitschr. f. Mal.*, 1846, p. 123.—*PHILIPPI Conchyl. Cab.*, p. 113, t. 19, f. 1; t. 41, f. 9.

The above description applies to the typical form of this species, the prominent characters of which are the smooth, subequal basal liræ, closely wrinkled upper surface, with projecting peripheral tubercles, and strongly uni-lamellar basal and parietal walls of the aperture. I have not examined enough specimens to say with any degree of certainty how constant these characters will prove to be. I observe considerable variation in the sculpture of the aperture inside in the species of this group; the liræ being sometimes completely absent in species which normally possess them. Whether the same variations attend the strong lamellæ of the present species, I cannot say.

T. ARCHITECTONICUS A. Adams. Pl. 42, fig. 1.

Shell conical, imperforate, whitish; whorls flat, subimbricating, longitudinally costate, the ribs thick, rounded, subnodose; base flat, concentrically strongly lirate; columella short, tortuous, truncate anteriorly; margin of lips fimbriated. (Adams.)

Signet Bay, North Australia (Dring.)

Pyramis architectonicus A. AD., *P. Z. S.*, 1857, p. 152.—*Trochus architectonicus* REEVE, *Conch. Icon.*, f. 22.

Evidently allied to the preceding. Reeve's figure is copied on my plate.

Subgenus INFUNDIBULUM Montfort, 1810.

Infundibulum MONTF., *Conch. Syst.*, p. 167.—*Carinidea* SWAINSON, *Treatise on Malacol.*, p. 350.—*Polydonta* SCHUMACHER, *Essai d'un nouv. Syst. etc.*, p. 231, (1817) and of H. & A. AD., *Gen. Rec. Moll.*, i, p. 414, and other authors, (not *Polydonta* Fischer de Waldheim, (1807))—*Lamprostoma* SWAINSON, *Treatise on Malacol.*, p. 350.

Section LAMPROSTOMA Swainson, 1840.

T. MACULATUS Linné. Pl. 9, figs. 100, 1, 2, 3.

Shell conic, solid, heavy, falsely umbilicate; spire strictly conic, or swollen and somewhat convex below, acuminate above, or sometimes constricted around the upper part of the last whorl; whorls about 10, quite planulate, or concave toward the upper, convex toward the lower margins, the last carinated at the periphery, flat beneath; color of upper surface consisting of longitudinal stripes or flames of brown, purplish, magenta, rose or coral red on a ground of white, corneous, pink or olive-tinted, the flames occupying more space than the ground color or vice versa; sometimes the coloration consists of very narrow numerous radiating lines, usually broken into tessellations articulating the liræ; the base is radiately painted with zigzag flames, or more frequently, narrow lines, either continuous or interrupted, often broken into a maculated or a finely tessellated pattern, sometimes unicolored lilac, or even white; sculpture of upper surface consisting of spiral beaded liræ, usually numbering six to eight on each whorl, the beads either laterally compressed like longitudinal folds or rounded and separate; base concentrically sculptured with numerous (about 10) fine, more or less beaded liræ; aperture transverse subtrigonal, outer lip lirate within, basal margin slightly curved, four or five dentate, parietal wall sometimes calloused and lirate, sometimes smooth; columella heavy, subvertical or oblique,

its margin irregularly dentate or nearly smooth, usually with a deep notch at its union with the basal lip; umbilical tract funnel-shaped, spirally feebly lirate or nearly smooth, not conspicuously bi-lirate.

Alt. 45, diam. 38 mill.

Philippines; Viti Is.; Singapore; Kingsmill Id.; Indian Ocean.

T. maculatus LINN., *Syst. Nat.* x, p. 756.—*T. callicoccus* PHILIPPI, *Zeitschr. f. Mal.* 1849, p. 150. (*juv.*) (pl. 9, fig. 33)—*T. altus* REEVE (*non* Phil.) *Conch. Icon.*, no. 13, 1862.—*T. gmelini* JONAS, *Zeitschr. f. Mal.*, 1846, p. 123.—? *T. spengleri* (CHEMNITZ et GMEL.) PHILIPPI, *Küst. Conch. Cab.*, p. 43, t. 9, f. 9.—*T. smaragdus* REEVE, *Conch. Icon.* t. 12, f. 66. (pl. 9, f. 39)—*T. rugulosus* KOCH, *Zeitschr. f. Mal.*, 1848, p. 128,—PHILIPPI, *Conchyl. Cab.*, p. 217, t. 32, f. 6.—*T. acutangulus* MENKE in PHILIPPI, *Conchyl. Cab.*, p. 101, t. 16, f. 12. (not of Chemnitz).—*T. Jonasi* PHILIPPI, *Conchyl. Cab.*, p. 260, t. 38, f. 9, 10.

This excessively variable form may be distinguished from its allies when typically developed, by the more numerous series of granules, more sharply carinated periphery, irregularly denticulate columella, obsoletely spirally plicate umbilical tract, etc. After carefully studying a large series of specimens from many localities, I am constrained to unite a number of forms heretofore considered distinct. I have little doubt that *T. creniferus*, *T. incrassatus*, *T. flammulatus* and some other forms will finally prove to be included in the range of variation of the protean *maculatus*.

T. spengleri is a doubtful synonym. *Vide T. sacellum* Phil.

Var. *VERNUS* Gmelin. Pl. 9, fig. 99.

A form in which the red and brown stripes are replaced by cold brown and green; the ground color is pure white or tinged with bluish green.

Trochus vernus Gmel., *Syst. Nat.* xiii, p. 3571—*T. granosus* Rve., (*non* Lam.) *Conch. Icon.*, sp. 97, 1862.

Var. *TENTORIUM* Gmelin. Pl. 7, figs. 66, 73.

Differs from the type in being obviously longitudinally plicate, especially on the lower part of each whorl.

Philippines; Viti Is.

T. tentorium Gmel., *Syst. Nat.* xiii, p. 3571.

Var. *VERRUCOSA* Gmelin. Pl. 7, figs. 64, 65.

Similar to *T. maculatus*, but each whorl encircled around the base by a series of prominent tubercles or short folds; last whorl

constricted around the upper part; aperture strongly lirate within, parietal wall lirate, or bearing a single acute spiral lamella.

Indian Ocean; *Zanzibar* (Reeve); *Java* (Fischer); *Viti Is.* (Acad. Coll.)

T. verrucosa Gmel., *Syst. Nat.* xiii, p. 3572.

The following variety is probably identical with this. It also is connected with the typical maculatus by intermediate examples.

Var. *GRANOSUS* Lamareck. Pl. 6, figs. 51, 60.

Convexly conical, solid, thick, the last whorl constricted around the upper portion; periphery obtuse.

Alt. 30, diam. 33 mill.; alt. 45, diam. 40 mill.

Indian O.; *New Caledonia* (Montronzier); *Philippines* (Acad. Coll.)

T. granosus Lam., *An. sans Vert.*, vii, p. 20.—*Polydonta gibberula* A. Ad., *P. Z. S.*, 1851, p. 155.

The last locality, measurement and figures are for *P. gibberula* Ad.

Var. *INCARNATUS* Philippi. Pl. 8, figs. 80, 81.

Conical, altitude and diameter about equal; roseate; upper surface granulate, and on the lower whorls and around the periphery strongly plicate-tuberculate; base flat, concentrically lirate, the liræ feebly granose, seven or eight in number. Alt. 26 mill.

T. incarnatus Phil., *Zeitschr. f. Mal.* 1846, p. 103.—*Küst. Conch. Cab.*, t. 16, f. 3.

Var. *SUBINCARNATUS* Fischer. Pl. 8, fig. 77.

Allied, according to Fischer, *T. maculatus*, but differing in the following characters: the form is more conic, last whorl less convex, less elevated, the spiral liræ on the inferior part of the last whorl less conspicuous, the longitudinal folds strongly developed, rendering the periphery dentate; *T. incarnatus* differs from this species in being less conical, smaller, more elongate, with fewer liræ on the base (7 or 8 instead of 12), etc. Alt. 32, diam. 39 mill.

Indian O. Mossi-Bé, near Madagascar.

T. subincarnatus Fischer, *Journ. de Conch.*, 1878, p. 24.—*Coquilles Vivantes*, t. 119, f. 6.—*T. incarnatus* Rve. (non Phil.), *Conch. Icon.* sp. 68.

T. INCRASSATUS Lamareck. Pl. 6, figs. 48–50.

Conical, thick, heavy, solid, whitish, radiately striped above and below with purplish red; outlines of spire convex; whorls 7 to 8,

coarsely granulose in about 5 or 6 spiral series, of which the upper series is most prominent; periphery rounded; base a little concave, with about 7 concentric granulose or subgranulose liræ; aperture strongly lirate within upon the parietal and outer wall, basal margin with four or five teeth; columella dentate; umbilical tract nearly smooth or obsoletely spirally plicate. Alt. 30, diam. 30 mill.

T. incrassatus Lam., *An. sans Vert.*, vii, 1822, p. 20.—*Philippi, Conchyl. Cab.* t. 18, f. 3,—*Fischer, Coq. Viv.* p. 113, t. 37, f. 1. Reeve, *Conch. Icon.*, f. 77.

Typically narrower, more solid than *T. creniferus*, with heavier parietal callus and not so strongly tuberculate around the periphery. *T. incrassatus* Phil. may be a synonym of *T. creniferus*.

Var. CRENIFERUS Kiener. Pl. 7. figs. 67, 68.

This is a form closely related to *T. maculatus*, *T. flammulatus* and *T. sandwichensis*, but more especially to *T. incrassatus*, and somewhat intermediate between these species in characters. It is strong thick and solid; the form is conical; the diameter exceeds the altitude; the outlines of the spire are slightly convex, the whorls nearly planulate, generally a little concave in the middle. The sculpture consists of four series of distinct, clearly cut, rounded granules upon each whorl, of which the upper and lower are elongated, like short folds, and apparently formed by the coalescence of the granules of two rows; upon the last whorl the sculpture sometimes seems to consist of oblique regular rather coarse folds, cut about the median portion by three narrow spiral furrows. There is a trace of the very fine secondary sculpture of minute oblique wrinkles upon many specimens, like that of *T. flammulatus*, but less strongly developed. The folds crenulate the periphery. The base is slightly convex toward the outer edge, concave in the middle, concentrically six-lirate, the liræ rather coarse, sometimes very superficial, and are regularly beaded. The aperture is brilliantly nacreous within; the outer lip is lirate within; the parietal wall is lirate, and colored like the base except for a slight deposit of whitish callus; the basal margin is thick, nearly straight, nearly smooth, or slightly dentate; the columella is oblique, pearly, quadri-dentate; the umbilical area is funnel-shaped, lined with a heavy white, porcellanous coat, which does not extend within the aperture, nor to the edge of the columella; it is obviously bi-lirate, one rib revolving at the lower edge and terminating in a denticle at the angle where the columella joins the base, the other sometimes bifid, a little within the cavity, not attain-

ing the columella edge. There is no notch at the junction of the columella and basal lip. The outer lip is slightly crenulated by the ribs on the outside. The ground-color is whitish or greenish; the purplish red radiating flammules of the upper surface may be either parallel with, and occupying the interstices of the ribs, or obliquely crossing them; sometimes the whole surface of the upper whorls is suffused with purplish red or with sea green (a color which underlies the red all over); the base is radiately marked with dark red, which forms continuous stripes, or is interrupted into small blocks which articulate the liræ. Toward the aperture there is a green or bluish tract.

Alt. 32, diam. 39 mill.; Alt. 30, diam. 32 mill.

Ceylon; New Caledonia (Fischer) Sandwich and Viti Is. (Phil. Acad. coll.)

T. creniferus KIENER, *Sp. Coq. Viv.*, t. 34, f. 3 (*sine desc.*) FISCHER, *Coq. Viv.*, p. 109, t. 34, f. 3.—*T. eustephes* PHILIPPI, *Zeitschr. f. Mal.*, 1849, p. 153, and *Conchyl. Cab.*, p. 293, t. 43, f. 6.

T. FLAMMULATUS Lamarck. Pl. 7, fig. 75; Pl. 8, figs. 78, 79.

General form similar to *T. maculatus*; thick, solid, heavy; upper surface longitudinally flammulate with dark red, the stripes distinct and broad, about as wide as the intervening whitish spaces; the stripes of the last whorl are continued over the obtuse periphery upon the base, where they become narrower, often bifurcate, and are zigzag. The sculpture above is like that of *T. maculatus*, the rows of granules about five or six on each whorl and the lower ones compressed, narrow; there is, besides, a fine, superficial, secondary sculpture of slightly oblique longitudinal minute wrinkles, which are continued over the periphery upon the base, forming there a finely shagreened pattern by the intersection of fine incremental striæ. The base is rather more convex than in the typical *maculatus*, and its outer portion is nearly free from spiral liræ. These number about six; they are finely, closely crenulated by the wrinkles of the surface. The outer lip of the aperture is not crenulated, the other characters of the aperture and columella are precisely as in *T. creniferus*.

Alt. 37, diam. 37 mill.; Alt. 42, diam. 38 mill.

Seychelles; Ins. Reunion, etc.

T. flammulatus LAM., *An. s. Vert.*, vii, p. 20.—PHILIPPI, *Conchyl. Cab.*, p. 112, t. 18, f. 8—FISCHER, *Coq. Viv.*, p. 98, t. 27, f. 2.

T. MIRABILIS G. B. Sowerby, Jr. Pl. 6, fig. 55.

Shell rather solid, fleshy-white, with longitudinal reddish-brown flames; whorls 10, flatly convex, deeply excavated at the suture, encircled spirally with strong granular ribs, between which the interstices are deep and plicated; spire acute; base rather convex, with rather a broad excavation, and a deep umbilicus above the columella; aperture nearly square, ridged within; columella furnished with nodulous plaits. Alt. 40, diam. 30 mill. (*Sowerby.*)

Moluccas.

T. (Polydonta) mirabilis Sowb., *P. Z. S.* 1875, p. 126, t. 24, f. 7.

The roughly granular ribs and the deeply excavated suture are its chief characters. (*Sowerby.*)

T. SANDWICHENSIS Souleyet. Pl. 1, figs. 1-3.

Rather straightly conical, falsely umbilicate, thick, solid; outlines of spire nearly straight, apex acute; whorls about 8, the last obtusely angulated at the periphery; sutures scarcely impressed; color of upper surface grayish or corneous white, broadly longitudinally striped with red or purplish, the red sometimes covering the whole surface, sometimes reduced to small maculations or narrow lines; base with narrow zigzag radiating red stripes. The sculpture of the upper surface consists of spiral series of very regular, deeply, separated rounded granules or beads, five or six rows on each whorl; on the periphery and base the granules are smaller; on the base the rows are more separated, and sometimes have minute intercalated beaded lirule in the interstices; there are 12 to 15 rows of beads on the entire last whorl. The aperture is small, strongly lirate inside the outer lip; basal margin thick, dentate; parietal wall callous, strongly lirate, deep crimson colored; columella oblique, irregularly 3 or 4 dentate; umbilical tract with a heavy white callus inside, obsoletely spirally bi- or tri-plicate.

Alt. 25, diam. 24 mill.

Sandwich Is.

T. sandwichiensis EYDOUX ET SOULEYET, *Zool. du Voy. de la Bonite*, pl. 37, f. 23, 24.—*T. intectus* KIENER, *Spec. gen. Trochus*, t. 37, f. 2.—*T. metallicus* REEVE, *Conch. Icon.* f. 94.—*T. tenebrius* REEVE, *Conch. Icon.* f. 81, 1861.

The nearly rectilinear spire, distinct, regular granulation, and the deep red parietal wall are diagnostic marks of this species.

T. CALCARATUS Souverbie. Pl. 2, fig. 15; Pl. 8, figs. 83, 84.

Shell false-umbilicate, elate-conic, solid; spire with nearly rectilinear outlines; whorls about 9, planulate, the last carinated; sculpture of upper surface consisting of spiral series, four or five on each whorl, of regular, closely arranged granules, which are either rounded, bead-like, or laterally compressed; and upon the periphery of each whorl, a row of radiating, minutely perforated pustules,—numbering on the last whorl 28; the base is concentrically sculptured with 6 to 7 concentric, densely granose liræ; it is slightly convex, radiately striped with brown or purplish; color of upper surface, whitish, broadly striped with red, purplish or brown; usually blue when rubbed; aperture lirate within on outer and parietal walls; basal margin concave, thick, dentate within; columella oblique, plicate within, quadridentate; umbilical tract white, biplicate. Alt. 32, diam. 28 mill.

Ins. Art and Duperry, N. Caledonian Archipelago; Philippines.

T. (Polydonta) calcaratus SOUVERBIE, *Journ. de Conch.*, 1875, p. 41, t. 4, f. 7.—*T. pustulosus* PHIL., *Zeitsch. f. Mal.* 1849, p. 188, *Conchyl. Cab.* p. 305, t. 44, f. 6, (pl. 8, fig. 85).—REEVE *Conch. Icon.*, f. 86.—*T. histrio* REEVE, *P. Z. S.*, 1848, p. 52, *Conch. Icon.*, 1861, f. 90 (pl. 8, fig. 87).—? *T. cumingii* A. AD. *P. Z. S.* 1851, p. 150. *T. cumingii* REEVE, *Conch. Icon.*, f. 88.

This form, like *T. tubiferus* Kiener, is principally distinguished by the fistulous or perforated peripheral tubercles. I have some hesitation in referring here as synonyms *T. pustulosus* Phil., and *T. histrio* Reeve. The first was described from a very young specimen; the latter was not well described, and as was his custom in Trochus, only a back view was given by Reeve, so that positive identification is difficult. For these reasons I adopt the French naturalist's name for the species.

T. cumingii (Ad.) Reeve (Pl. 43, fig. 11,) may be the young of this species, but on account of the slender form I hesitate to place it here. It is at all events a young shell. Specimens which agree exactly with Reeve's figure are before me. They exhibit about 7 planulate whorls, the sculpture of which consists of about five or six spiral granulose liræ on each whorl; the lower third or half of each whorl is strongly plicate, each fold terminating in a solid tubercle at the periphery; of these tubercles there are 18 on the last whorl; the base is flat, somewhat concave, 6 to 7 lirate; outer lip lirate within; basal lip and columella thin, without teeth, as is usual in

young shells of this group. Color greyish, more or less green tinged, and maculate with purplish brown, the lower part of each whorl encircled by a purplish or red band; base minutely maculate with reddish. Alt. 11-12, diam. 9-10 mill.

Locality, *Philippines*.

T. FASTIGIATUS A. Adams. Vol. x, Pl. 43, fig. 60.

Shell conical, imperforate, red, variegated with longitudinal white maculations; whorls plane, concave in the middle, ornamented above with three series of nodules, furnished with subspinous nodules at the sutures; base plane, concentrically lirate, the liræ crenulated; columella posteriorly canaliculate, anteriorly truncated; lip angulate in the middle. (*Adams*.)

Trochus fastigiatus A. ADAMS, *P. Z. S.*, 1851, p. 150.—REEVE *Conch. Icon.*, f. 87.

Evidently allied to *T. calcaratus* Souv.

T. LACINIATUS Reeve. Pl. 42, fig. 16.

Shell excavately umbilicated, rather sharply conical, green, stained with purple-brown; whorls rather concavely flattened, regularly spirally granulated, neatly plicately tubercled at the margin, tubercles descending; base flat, grain-ridged, ridges rather distant.

(*Reeve*.)

T. laciniatus REEVE, *Conch. Icon.*, f. 76 (1861).

Similar in form and sculpture to *T. tubiferus*, Kn., but differs in the smooth-edged columella.

T. TUBIFERUS Kiener. Pl. 6, figs. 62, 63.

Shell conical, altitude and diameter about equal, false-umbilicate, solid, thick; spire with rectilinear or slightly convex outlines; whorls about 9, planulate, or a little concave, the last carinated and spinose at the periphery; color above grayish, maculated with purplish brown and faint green; base radiately striped, lineolate or maculate with brown; upper surface of whorls closely granulose, and each whorl bearing at its periphery about 17 radiating perforated short spines; base slightly convex, with 10 to 12 narrow closely granulose concentric liræ; aperture white within, outer and parietal walls strongly lirate, parietal wall the same color as the base, but overlaid with a white callus; basal margin straight, very thick, dentate; columella oblique, its edge convex, quadri-dentate, within spirally

pligate; umbilical area white, funnel-shaped, callous, rather narrow, obsoletely spirally costate.

Alt. 35, diam. 36 mill.

New Caledonian Archipelago; Uvea; Viti Is.

T. tubiferus KIENER, *Spec. gen. Troque*, t. 37, f. 3.—FISCHER, *Coq. Viv.* p. 116.—*T. concinnus* PHIL., *Zeitsch. f. Mal.*, 1846, p. 105. (young.)—REEVE, *Conch. Icon.* f. 15.—*Polydonta squamigera* A. AD., *P. Z. S.*, 1851, p. 155.—*T. obesus* REEVE, *Conch. Icon.* f. 75. (pl. 8, fig. 82.)

The numerous liræ of the base separate this form from *T. calcaratus*, with which it agrees in the perforated or fistulose spines. These are sometimes subobsolete, and frequently solid on the last whorl.

T. squarrosus Lamarck. Pl. 6, figs. 60, 61.

Shell umbilicate, conic-pyramidal, thick, radiate with white and and rose color; whorls 9, the embryonic smooth, the following planulate, sculptured with spiral series of regular beads the remaining whorls subexcavated in the middle, with three series of granules on the upper part and a series of oblique short folds below; last whorl carinated, with 16 to 24 folds crenulating its periphery; base planulate, with six concentric granulose liræ, separated by interstices as wide as the ridges; aperture rhomboidal; lirate within; umbilical area spirally plicate.

Alt. 35, diam. 40 mill. (*Fischer.*)

Ins. Réunion; Upolu; Sandwich Is.

T. squarrosus LAM., *An. s. Vert.* vii, p. 20. 1822.—*T. regius* DESH. in LAM., *An. s. Vert.* ed. 2, ix, p. 155. (*non regius* Reeve, *Conch. Icon.* f. 10.)—*T. oblitus* REEVE, *Conch. Icon.* t. 16, f. 98.

T. rubricatus Philippi. Pl. 7, figs. 70, 71.

Shell false-umbilicated, conical, whitish, maculated with purplish red; whorls 8, separated by an undulating suture, planulate, the apical eroded, the following obliquely, finely striate, spirally lirate with 5 to 6 liræ, the three upper ones distinct, two or three lower obsolete; lower part of the whorl nodose, the nodules prominent; last whorl carinated, crenulated at the periphery with 16 nodules; base marked with radiating, flexuose lines and 8 to 9 concentric, granulose, liræ, the interstices between those in the center wider and marked with minute parallel liræ; aperture rhomboidal, lirate within; basal margin plicate; columella oblique, umbilical area funnel-shaped, with a spiral ridge.

Alt. 17, diam. 22 mill. (*Fischer.*)

Japanese Seas.

T. rubricatus PHIL., *Zeitschr. f. Mal.*, 1848, p. 125.—*Conchyl. Cab.*, p. 213, t. 31, f. 13.—FISCHER, *Coq. Viv.*, p. 352, t. 110, f. 1.

Typical specimens of this form I have not seen.

T. CREBRIGRANATUS Reeve. Pl. 6, figs. 56, 58, 59.

Shell umbilicate, conical, elevated, thick, whitish yellow, flammulate with roseus; whorls 11 to 12, planulate, the first whitish, eroded, the following spirally cingulate, the cinguli granose, unequal, on the last whorl five, of which the first, fourth and fifth are larger than the others, the fourth most prominent; last whorl slightly elevated, carinate and crenulate at the periphery, planulate beneath, radiately subcostate and concentrically cingulate, the ridges about 7, granose; aperture rhomboidal, lirate within, the basal margin crenated; columella oblique; its edge six-nodose; umbilical area plicate. Alt. 24, diam. 19 mill. (*Fischer.*)

Habitat unknown.

T. crebrigranatus REEVE, *Conch. Icon.* f. 89, 1861.—FISCHER, *Coq. Viv.* p. 307, t. 97, f. 3.

In its elongated, narrow form, crenulated periphery, and serrate unequal tubercles, this species is very distinct. (*Fischer.*)

T. LINEATUS Lamarek. Pl. 7, fig. 76.

Shell false umbilicate, acutely conical; whorls 9, planulate, whitish, ornamented with narrow, close, obliquely descending rosy or purple lines, and sculptured with numerous small, inconspicuous, granose spiral liræ; upper whorls subnodose at the sutures, the lower nearly smooth; last whorl carinated, a little compressed in the middle, planulate beneath, and ornamented with radiating lines and 8 to 9 concentric liræ; aperture rhomboidal; columella straight, with 4 or 5 teeth; basal margin tuberculose within.

Alt. 40, diam. 38 mill. (*Fischer.*)

Australian Seas.

T. lineatus LAM., *An. s. Vert.*, vii, p. 23.—FISCHER, *Coq. Viv.*, p. 100, t. 28, f. 2.—*T. hanleyanus* REEVE, *P. Z. S.*, 1842, p. 184; *Conch. Syst.*, ii, t. 118, f. 11; *Conch. Icon.* f. 2. (Not *T. hanleyanus* Phil.) ? *T. eugrammus* PHIL., *Zeitschr. f. Mal.* 1849, p. 153; *Conchyl. Cab.*, p. 299, t. 43, f. 17 (Pl. 43, figs. 4, 5).

The *T. hanleyanus* of Reeve (Pl. 12, figs. 84, 85) may perhaps be considered a variety.

T. SACELLUM Philippi. Pl. 6, figs. 54, 57.

Shell false-umbilicate, conical, thick, reddish, maculate with white; whorls about eight, obliquely striate, spirally cingulate, cinguli numbering 6 on the penultimate whorl, the first (upper) large, composed of tubercles confluent two by two; second and third composed of distinct tubercles, fourth and fifth have the tubercles connected, forming radiating costæ, sixth composed of spiniform tubulose tubercles alternating with simple grains; last whorl carinated, crenulated at the periphery (by about 18 nodes), below plano-convex, white and red variegated, concentrically lirate, liræ granose, equal, about 8 in number, separated by concentrically striate interstices; aperture rhomboidal, lirate within; columella plicate-dentate; umbilical area white, spirally sulcate. Alt. 17, diam. 18 mill. (Fischer.)

China; Japan.

T. sacellum PHIL., *Conch. Cab.* p. 309, t. 44, f. 13.—REEVE, *Conch. Icon.*, f. 93.—FISCHER, *Coq. Viv.* p. 412.

Var. PHILIPPINARUM Fischer. Pl. 6, fig. 57.

Short, red, the peripheral tubercles less developed.

Luzon, Philippines. (Cuming.)

T. sacellum REEVE, *Conch. Icon.*, t. xiv, f. 78.—Var. β (*T. philippinarum* FISCHER *Coq. Viv.* t. 120, f. 5.

The *T. sacellum* is probably, as Lischke declares, merely a nodose form of *T. spengleri* (Chemnitz) Gmel. If this be true, Dr. Fischer's var. β . *philippinarum* is nearly synonymous with the typical *spengleri*. My reason for not adopting the latter name is that the figure of Chemnitz, copied by Philippi, is so very poor that one would scarcely recognize it for the present species. Fig. 12, pl. 43, represents the *T. spengleri* var. *a* of Lischke. The synonymy, if we admit *T. spengleri* to be identical with the species under consideration will stand as follows:

(Typical form.)

Trochus Spengleri grandinatus, perforatus, etc. CHEMNITZ, *Conchyl. Cab.* v, p. 92, t. 169, f. 1631. (1781).—*T. spengleri* GMELIN, *Syst. Nat.* xiii, p. 3571, no. 27. (1788).—PHILIPPI, *Conchyl. Cab.* II, p. 43, t. 9, f. 9.—LISCHKE *Jap. meeres-conchyl.* p. 93.

(Var. *A. periphery with obtuse nodes.*)

"*Trochuli pyramidales umbilicati*," etc, (in part) CHEMNITZ, *Conchyl. Cab.*, p. 100, t. 170, f. 1653.—*Trochus pyramis* β , GMELIN, *Syst. Nat.*, xiii, p. 3573, no. 39,—*T. spengleri* var. β , PHILIPPI,

Conchyl. Cub. II, p. 44, t. 10, f. 15.—*T. sacellum* REEVE, *Conch. Icon.* f. 78, 93.—*T. sacellum* var. β , (or *T. philippinarum*) FISCHER, *Coq. Viv.*, p. 412.

(*Var. B. periphery with acute spine-like nodes.*)

Trochus sacellum PHILIPPI, *Conchyl. Cub.* II, p. 309, t. 44, f. 13.—FISCHER *Coq. Viv.* p. 412.

I quote Chemnitz merely because authors have referred to his figures. The first binomial name is that of Gmelin.

T. ROTA, Dunker. Pl. 12, figs. 75–77.

Shell conical, white or greenish, marbled or spotted irregularly with red maculations; whorls planulate, subgranose, encircled above with two or three spiral series of tubercles, costate below, the folds thick, suboblique, produced at the periphery into 17 to 18 obtuse spines; base concave, bearing 7 to 8 concentric subnodose liræ; false umbilicus deep, contorted; columella subnodose; basal lip subserrate; aperture rhomboidal, fauces sulcate.

Alt. 20, diam. 25 mill. (*Dunker.*)

Japan; (Nagaski, Decima, Ooshima).

T. rota DKK., *Malak. Blätt.*, vi, p. 238, 1860.—*Moll. Japonica*, p. 21, t. 3, f. 4.—LISCHE, *Jap. Meeres-Conchyl.*, 1869, p. 94, t. 6, f. 20, 21.—*Polydonta gloriosum* GOULD, *Proc. Bost. Soc. Nat. Hist.*, 1861, p. 19.—*Otia*, p. 158.

This lovely species is closely allied to *T. spengleri*, but is distinguished by the following characters: the form is broader; the whorls are more constricted above the peripheral nodes; the granulation is finer, and often on the last whorl is wholly lost, or transformed into small, irregular ridges; the peripheral nodes are narrow, long, often claw-shaped and crooked; the base is slightly concave, and the ground color is greenish. (*Lischke.*)

Figs. 76, 77 represent a depressed variety.

T. BICRENATUS Gould. Pl. 16, figs. 62–65; Pl. 12, figs. 68, 69.

Shell low, pyramidal, acute at apex; base and height nearly the same; base flat, pale yellowish, marked with delicate equal and equidistant beaded revolving lines; umbilical pit like a vortex, of a smooth ivory white polish; whorls 7 to 8, slightly excavated; basal edge acute, and furnished with about 15 scallops; above this are three lines of beaded granules, arranged also in oblique lines, which extend in the form of slight folds to the edge of the periphery, producing, by their extension, three or four crenulations of a rose-tint

between each of the scallops, so that the periphery, when viewed below, appears doubly crenulated; columella sharp, contorted; aperture trapezoidal; color flamed alternately darker and paler brown. (*Gould.*) Alt. 15, diam. 21 mill.

Singapore (Phil. Acad. Coll.).

T. bicrenatus GOULD, *Proc. Bost. Soc. Nat. Hist.*, iii, p. 106, 1849. *U. S. Expl. Exped.*, xii, p. 175, t. 13, f. 221.

Two specimens of this species marked "Singapore" are before me. They differ from the type as figured and described by Dr. Gould in various characters. One of them is figured on Pl. 12, figs. 68, 69. The whorls are planulate, spirally granose-lirate, the liræ about 8 on each whorl, but sometimes nearly obsolete; the lower third of each whorl is strongly, regularly folded, the folds scalloping the periphery; the base is flat, very finely, subobsoletely, concentrically granose-lirate; the coloration above consists of fine close obliquely descending narrow red lines on a white ground; beneath of radiating narrow lines. Alt. 17, diam. 22 mill.

T. IGNOBILIS Philippi. Pl. 12, figs. 82, 83.

Shell elevated conical, whitish, painted with rufous radiating flexuous lines; whorls 6 to 7, planulate, above with four spiral furrows, the last obtusely angulated; base flattened, with 6 to 7 concentric sulci; center false-umbilicate; columella contorted above; aperture rhomboidal; outer lip with four revolving liræ within, parietal wall with one, the base with three spiral liræ, ending in denticles; columellar edge four toothed.

Alt. 18, diam. 17 mill. (*Philippi.*)

Sandwich Is.

T. ignobilis PHIL. *Zeitschr. f. Mal.* 1846, p. 102.—*Conchyl. Cab.* p. 98, t. 16, f. 5.

A species unknown to me save by Philippi's description and figure. It may, perhaps, be allied to *T. scabrosus*, Phil.

T. TRICATENATUS Reeve. Pl. 43, figs. 7, 8.

Shell excavately umbilicated, rather obtusely conical, solid, sometimes fulvous white, flamed with rose, sometimes greenish flamed with ash-olive; whorls narrowly three-chained at the upper and lower parts, encircled around the middle with three rows of strong grains, basal margin rounded; base rather convex, closely serially grained, sparsely spotted. (*Reeve.*)

Habitat unknown.

T. tricatenatus REEVE, *Conch. Icon.*, f. 91. (1861.)

The whorls of this species are encircled with three rows of bold wart-like grains, bound above and below by a narrow, transversely stretched chain. (Reeve.)

Compare *T. sandwichensis*, a species with which this may prove identical.

Section INFUNDIBULUM (*s. str.*)

T. RADIATUS Gmel. Pl. 8, figs. 88–93.

Shell false-umbilicate, rather solid, conical, the spire with nearly straight outlines, apex acute, generally eroded and orange-colored; whorls about 7, planulate, sometimes a little concave in the middle; color whitish; tinged with green, and radiately striped with broad or narrow crimson flames, base white or pink, radiately marked or minutely speckled with red; upper surface sculptured with granulose spiral liræ, 5 or 6 on each whorl, uneven in size, the upper row largest; last whorl angulate at the periphery; base nearly flat, concentrically lirate, the liræ granulose, rather coarse, with broad interspaces, which are frequently occupied by revolving lirulæ or striæ; aperture large, subrhomboidal, lirate within; basal lip thickened, crenate; columella oblique, strongly plicate above, its edge nearly smooth; umbilical tract funnel-shaped, rather broad, with a central rib; parietal wall scarcely callous, showing the color of the base, and with a white spiral rib in the middle.

Alt. 25, diam. 30; alt. 23, diam. 25 mill.

Indian O.; Red Sea; Singapore; Madagascar; Ceylon.

T. radiatus GMEL., *Syst. Nat.* xiii, p. 3572, No. 33.—PHILIPPI *Conch. Cab.*, p. 46, t. 10, f. 6–8.—REEVE, *Conch. Icon.*, f. 80.—FISCHER *Cog. Viv.*, p. 304, t. 97, f. 1.—*T. vividus* REEVE, *Conch. Icon.*, f. 72, 1861 (Pl. 8, fig. 86).—*T. surgillatus* REEVE, *Conch. Icon.*, f. 85 (pl. 42, fig. 8).—*T. festivus* PHILIPPI, *Conchyl. Cab.*, p. 116, t. 19, f. 5 (Pl. 43, figs. 9, 10).—*T. eucosmus* PHILIPPI, *Zeitschr. f. mal.* 1848, p. 104, et *Conchyl. Cab.*, p. 260, t. 38, f. 11.—? *T. nobilis* PHILIPPI, *Conchyl. Cab.*, p. 86, t. 15, f. 6, (= *T. gemmosus* MKE., *Spec. Moll. Nov. Holl.*, p. 16, teste Philippi).—? *T. infuscatus* PHILIPPI, *Conchyl. Cab.*, p. 329, t. 46, f. 15 (Pl. 43, figs. 2, 3).

The conspicuously radiate color pattern and the sculpture, consisting of coarse granulose liræ with interstitial lirulæ both above and below, as well as the wide umbilical tract and eroded corneous or orange apex, will serve to distinguish this form.

T. TEXTILIS Reeve. Pl. 42, fig. 7.

Shell excavately umbilicated, rather broadly conoid, pinkish-brown, sparingly speckled with black; whorls concavely flattened, finely spirally granulated, basal margin rounded; base rather concave, ridged, ridges smooth, alternately larger, profusely dotted with purple-red. (*Reeve.*) *Cape of Good Hope* (*Reeve.*)

T. textilis REEVE, *Conch. Icon.*, f. 82. (1861.)

Of a sombre rose-brown hue, freckled with an irregular network of black, the base of the shell being profusely dotted with a rich purple-red. (*Reeve.*)

Known to me only by Reeve's description and figure. The locality is doubtful.

T. VENETUS Reeve. Pl. 7, figs. 69, 74.

Shell false-umbilicate, conical, thick, ornamented with wide greenish and purplish longitudinal streaks; whorls 7 to 8, the first eroded, the following spirally lirate, the liræ granose, numbering five on the penultimate whorl, the upper ridge large, composed of oblique, oblong tubercles, the lower ridges narrow; last whorl angulated, planulate beneath, with 5 to 6 concentric narrow liræ; aperture subquadrate, lirate within; basal margin thickened; columella oblique, without teeth, contorted above; umbilical area funnel-shaped, with a single spiral funicle. Alt. 31, diam. 31 mill. (*Fischer.*)

Moluccas (*Reeve.*)

T. venetus REEVE, *Conch. Icon.*, 1862, t. xvi, f. 99a, 99b.—*Fischer, Coq. Viv.*, p. 348, t. 109, f. 3.

A species allied in form, sculpture and coloration to the group of *T. flammulatus* or *T. radiatus*, but without teeth on the columella.

T. CHLOROMPHALUS A. Adams. Pl. 12, figs. 62–65.

Shell false-umbilicate, thick, conoid, apex acute; whorls 8, the first yellowish, the following planulate, greenish, ornamented with flexuous brown lines; separated by a slightly impressed suture, spirally cingulate, the penultimate whorl with about 7 granose unequal ridges, the upper two large, third and fifth smaller; last whorl carinated, plano-concave beneath, with 7 concentric liræ, slightly or not at all granulose, separated by obliquely striated interstices; aperture rhomboidal, grooved within, the basal margin subcrenate; columella oblique, folded above, compressed in the middle and toothless; umbilical area funnel-shaped, like an umbilicus; bordered with intense green. Alt. 19, diam. 22 mill. (*Fischer.*)

Japanese Seas; Nagasaki. (*Lischke.*)

Infundibulum chloromphalus A. AD. P. Z. S. 1851, p. 153.—*T. chloromphalus* LISCHKE, *Jap. Meeres Conchyl.*, p. 92, t. 6, f. 17, 18.—FISCHER, *Coq. Viv.* p. 285, t. 92, f. 4.

The following varieties are diagnosed by Dr. Fischer:

Var. β . Form normal; umbilical area not margined with green.

Var. MEDERI Fischer. Pl. 12, figs. 66, 67.

More elongated, ornamented with wide deep brown longitudinal bands, the spiral line of the base separated by intermediate lirulæ.

Alt. 19, diam. 21 mill.

Arou Is.

T. NIGROPUNCTATUS Reeve. Pl. 42, figs. 2, 3.

Shell rather largely, excavately umbilicated, shortly conical, ash-green, obliquely flamed with black; whorls flatly convex, spirally very closely gemmed with regular grains; base grain-ridged, interstices crispately decussated, ridges dotted with black; dots conspicuous, distant. (*Reeve.*)

Natal.

T. nigropunctatus RVE., *Conch. Icon.*, f. 71. (1861).—*T. hanleyanus* PHILIPPI, *Conchyl. Cub.*, t. 16, f. 2. (not *T. hanleyanus* Rve.) *T. subviridis* PHILIPPI, *Zeitschr. f. Mal.*, 1848, p. 126.—*Conchyl. Cub.*, p. 259, t. 38, f. 7. (pl. 42, figs. 4, 5.)

The surface of this species is grained with unusual regularity, and the base is very characteristically sprinkled at rather distant intervals with blue-black dots. (*Reeve.*)

I consider the locality doubtful.

T. KOCHII Philippi. Pl. 5, figs. 36, 37.

Shell conical, broad, rather solid; spire conic, apex generally eroded, corneous or orange colored; whorls about 7, a little convex, whitish, painted with oblique flexuose or angular brownish green radiating stripes, nearly the whole surface sometimes suffused with bright green by the erosion of the outer layer; the sculpture consists of inconspicuous incremental striae and very oblique subobsolete folds; base very obsoletely lirate; flat, the middle portion (umbilical tract) excavated, concave, strongly spirally grooved, the sculpture not extending into the aperture nor to the edge of the columella, which is nacreous; aperture very oblique, large, very iridescent and neither lirate nor toothed within; basal lips and columella simple, forming a regular curve; columella with a strong dentiform fold above; parietal wall eroded, green, nearly smooth.

Alt. 32, diam. 38; alt. 28, diam 40 mill.

Indian O; Red Sea.

T. kochii Phil., *Abbild. u. Beschreib*, i, t. iv, f. 8, 1844.—Fischer, *Coq. Viv.* p. 120—*T. listeri* Kiener, *Species*, t. 39, f. 2, (non Wood).

A distinct, well-marked form. The broadly concave base, rounded periphery, etc., sufficiently characterize it.

T. CONCAVUS Gmelin. Pl. 43, fig. 13.

Shell false-umbilicate, regularly conic, concave below; color greenish and roseus, under a dull grayish-green cuticle; outlines of spire nearly rectilinear; whorls 7 to 8, planulate, very obliquely striate, radiately corrugated, and covered with a very minute secondary sculpture of radiating, fine, close wrinkles; last whorl acutely carinated at the periphery; base concave, concentrically lirate, the liræ about 6 to 8 in number, granose in the young, nearly smooth in the adult; aperture very oblique, covering half the base, outer lip crenulated by the folds of the outside; basal margin straight, thin, simple; columella oblique, with a strong fold above, projecting into the aperture, insertion very deep parietal wall lirate; umbilical tract white or yellowish, spirally costate in young, smooth in fully adult specimens. Alt. 35–40 diam. 45–47 mill.

Indian O.; Seychelles; Madagascar, etc.

T. concavus GMEL., *Syst. Nat.* xiii, p. 3570, no. 21.—and of authors generally.

A very distinct form, with aperture so oblique as to resemble a *Calyptræa*.

Section INFUNDIBULOPS Pilsbry, 1889.

T. ERYTHRÆUS Brocchi. Pl. 5, figs. 32–35.

Shell conical, false-umbilicate, rather thin and inflated; apex acute; whorls about 7, somewhat concave and generally traversed by several conspicuously granose liræ in the middle, a little gibbous above and below, obliquely undulate below the sutures, and frequently on the periphery also, the whole surface more or less finely spirally lirate, the liræ subgranulose; base convex, concentrically lirate with about 7 granose narrow liræ, their interstices generally occupied by concentric striæ; color cinereous grayish or pinkish, striped and maculated above with reddish; unicolored pinkish or radiately marked below; aperture large, smooth and pearly within, the basal lip simple; columella oblique, very deeply inserted, its entire edge nearly straight, not dentate; umbilical tract deep, narrow, pearly,

bearing a single strong spiral white rib near its base, which does not attain the edge of the columella. Alt. 33–35, diam. 37–40 mill.

Red Sea.

T. erythræus BROCCHI, *Cat. di una ser. di Conchiglie*, etc., p. 29. (1819–1823.)—*T. kochii* KIENER, *Spec. gen. Trochus*, t. 35, f. 2. (non *T. kochii* Phil.)—*T. fictilis* JONAS *Zeitschr. f. Mal.*, 1846, p. 125.—PHILIPPI, *Conchyl. Cab.* p. 288, t. 42, f. 10.—? *T. crebriliratus* JONAS, *Zeitschr. f. Mal.*, 1846, p. 125—PHILIPPI, *Conchyl. Cab.*, p. 289, t. 42, f. 11. (pl. 42, fig. 14, 15.)

T. SAGA Philippi. Pl. 14, figs. 14, 15.

The shell is conical, the whorls almost completely planulate, the suture not impressed; on the examples before me the last whorl is, descending, whilst the lower margin of the penultimate projects, and passes with a blunt rounded angle to the level base. The sculpture upon the upper side consists of 8 or 9 spiral series of granules; upon the base of 6 to 7 feebly developed concentric liræ; the last whorl shows fine obsolete longitudinal costæ; aperture and columella precisely as in *T. erythræus* to which this species is closely allied. The coloration in the examples before me is very constant, yellowish white with broad red rays, the base white, the liræ articulated with red. Alt. 17, diam. 20 mill. (*Philippi*.)

Habitat unknown.

T. saga PHIL, *Zeitschr. f. Mal.* 1846, p. 103.—*Conchyl. Cab.* p. 99, t. 16, f. 6.

The above paragraph, from Philippi, contains all the information I possess about this form, which is evidently closely allied to *T. erythræus*.

T. CARINIFERUS (Beck) Reeve. Pl. 5, figs. 38–42.

Shell false-umbilicate, wide-conical, rather thin, dark green, the upper surface irregularly broadly maculate with crimson or purplish red, the ribs of the base articulated with the same; whorls about 6, somewhat convex, the upper surface of each whorl with usually four or five spiral closely granose liræ, in the interstices between which sharp microscopic oblique and spiral striæ are visible under a lens; body-whorl carinated at the periphery, usually with six liræ on the upper surface, convex beneath, concentrically lirate, the liræ very narrow, feebly granose or nearly smooth, separated by wide lightly obliquely striate interspaces, the inner liræ closer; aperture rhomboidal; columella not folded above, but straight from the insertion

to the base, its edge simple; umbilical area deep, rather narrow, white, smooth, with a spiral rib just inside the margin, and with its outer border tinged with red.

Alt. 14, diam. 16 mill; alt. 18, diam. 21 mill.

Indian O; Madagascar; Zanzibar; Red Sea; Chinese Seas; Liewkiew Is. (Philippi.)

T. cariniferus BECK in REEVE, *Conch. Syst.* ii, t. 118, f. 8, 1842. (no description).—PHILIPPI, *Conch. Cab.*, t. 38, f. 6;—FISCHER, *Coq. Viv.*, p. 229, t. 75, f. 1, 2.

The straight columella shows this species to be nearly related to *T. erythræus*. The description is drawn from typical examples from Madagascar. A variety differing in coloration is figured by Fischer. (see pl. 5, fig. 40).

Section CÆLOTROCHUS Fischer, 1880.

Cælotrochus FISCHER, *Coq. Viv.*, p. 417.

T. TIARATUS Quoy et Gaim. Pl. 12 figs. 72-74.

Shell very deeply false-umbilicate, depressed conical, rather thin; spire with slightly convex outlines; apex acute, lemon yellow when eroded; whorls 5 to 5½, nearly planulate, but the upper margin of each whorl prominent and projecting beyond the periphery of the preceding; last whorl carinated at the periphery; sculpture above consisting of spiral liræ, about 5 to 8 on each whorl, cut into close oblique beads, the interstices obliquely finely striate, one or two of the broader ones usually with a central riblet; color whitish or yellowish, finely tessellated or articulated with reddish brown, the tessellations formed by the disintegration of narrow radiating stripes, which are on the base frequently continuous; base nearly flat, with seven or eight concentric close fine liræ, which are crenulated in a peculiarly irregular manner by distinct short oblique impressed marks, the interstices finely radiately striate; aperture subrhomboidal, smooth within; columella oblique, nearly straight, with an obsolete, scarcely perceptible fold above, inserted upon the side of the umbilicus, not in its center; umbilical area white or yellow, smooth; false-umbilicus deep and narrow, but partly filled by a white callus, not tapering to a point. Alt. 10, diam. 13½ mill.

T. tiaratus Q. ET G., *Voy. de l'Astrolabe*, iii, p. 256, t. 64, f. 6-11, 1832.—KIENER, *Spec. Troque*, t. 22, f. 2.—HUTTON, *Cat. Mar. Moll. N. Z.*, p. 36.—FISCHER, *Coq. Viv.* p. 90.—and of other authors.—*T.*

delicatulus PHILIPPI, *Zeitschr. f. Mal.* 1846, p. 105.—*Conchyl. Cab.*, p. 176, t. 28, f. 1. (pl. 12, figs. 70, 71).—*Polydonta elegans* GRAY, in Yate's *Account of New Zealand*, p. 309. 1835.

This small trochid is evidently allied to the preceding species in the peculiarly straight columella and the somewhat tumid aspect of the upper part of each whorl. From *T. erythraeus* and its allies the flat base, and especially the insertion of the columella *on the side*, instead of in the *center* of the false-umbilicus will at once separate this form. Dentition (pl. 50, fig. 4.)

T. CHATHAMENSIS Hutton.

Whorls flat with an elevated upper edge, and, together with the base, spirally striated; columella with a slight posterior fold, anterior portion nearly smooth; axial cavity small, smooth; white with pink or brownish purple markings; base white with interrupted pink spiral lines. Alt. $7\frac{1}{2}$, diam. 9 mill. (*Hutton.*)

Chatham Is.

Polydonta chathamensis HUTTON, *Cat. Mar. Moll. N. Z.*, 1873, p. 36.

Section ANTHORA Gray, 1857.

Anthora GRAY, *Guide Syst. dist. moll. Brit. mus.*, p. 148.

T. VIRIDIS Gmelin. Pl. 3, figs. 16, 17; Vol. x, pl. 40, fig. 21.

Shell conical, solid, false-umbilicate; spire conic, with nearly straight outlines, apex acute; whorls about 7, nearly planulate, or sometimes a little bulging at the upper and lower margins, the last whorl carinate at periphery; color dull gray, whitish or greenish; sculpture of upper surface consisting of five series to each whorl of rounded, bead-like granules, between which are visible numerous very minute spiral striæ, in the interstices of which oblique incremental striæ are prominently shown (under a lens); base plano-concave, concentrically striate, the striæ unequal, disappearing toward the outer edge; aperture suboval, brilliantly nacreous and iridescent within, outer lip lirate within, basal margin thickened, subdentate, uniting with the columella in a regular curve; columella oblique, with a deep fold near its insertion, smooth within; umbilical area with 3 or 4 spiral ribs; parietal wall smooth, covered with a brown callus. Alt. 20, diam. 19 mill.

New Zealand; Chatham Is.; Norfolk Id.

T. viridis GMEL., *Syst. Nat.* xiii, 1788, sp. 34, p. 3572.—REEVE, *Conch. Icon*, f. 79. (Vol. x, pl. 40, fig. 21).—*Polydonta tuberculata*

GRAY, in *Dieffenbach, Travels in New Zeal.*, p. 239.—*T. acinosus* GOULD, *U. S. Expl. Exped.*, f. 217 (pl. 3, figs. 16, 17).—*T. fulvolabris* HOMER. ET JACQ., *Voy. au Pole Sud.* pl. xiv, f. 14–16.—*Polydonta tritonis* A. AD., *P. Z. S.* 1855, p. 132.

The synonymy of this species was worked out by Dr. Fischer. There is but little variation in the several suites I have examined. The more prominent characters are the regular beads, the secondary sculpture of fine striæ, the striate base, and especially the brown; parietal callus.

The animal is yellowish brown, foot reddish or purplish brown filaments white, three on each side. The head lobes are smooth and rounded, and joined together across the head; the eyes are on rather long white peduncles.

Section PRÆCIA Gray, 1857.

Præcia GRAY, *Guide Syst. dist. moll. Brit. Mus.*, p. 148.

T. ELEGANTULUS Wood. Pl. 14, figs. 16, 17.

Shell perforate, conical, white, maculated with red or brown, yellowish beneath; whorls 9, the first 7 exactly conical, planulate, ornamented with 4 or 5 spiral series of small granules, the lower margin nodulous, and with a double row of granules; penultimate whorl convex, nodose below, the nodules heavy; suture profound; last whorl convex, ornamented with about 15 or 16 oblong nodules around the periphery, plano-convex beneath, with 7 to 9 concentric liræ; umbilical area broad, yellowish, with a spiral ridge; aperture subrhombic, canaliculate within, the basal margin plicate; columella tortuous, denticulate below and within.

Alt. 25, diam. 23 mill. (*Fischer.*)

Ceylon (Wood.)

T. elegantulus WOOD, *Ind. Test.*, suppl., t. 5, f. 9.—REEVE, *Conch. Icon.* f. 96.—FISCHER, *Coq. Viv.*, p. 194, t. 63, f. 1.—*T. hysginus* VALENCIENNES, *Voy. de la Vénus*, Moll., t. 4, f. 3.

A shell of remarkable form; the first 7 whorls are flat and form an exactly conical spire; the two last whorls are convex, globose, and bear a series of nodules on the lower part. (*Fischer.*)

Section BELANGERIA Fischer, 1880.

Belangeria FISCHER, *Coquilles Vivantes*, p. 415.

T. SCABROSUS Philippi, Pl. 12, figs. 78–81.

Shell false-umbilicate, conic, thick, solid; outlines of spire nearly straight; whorls 6 to 7, planulate, the last often constricted, carinate

at the periphery; color whitish, longitudinally flammulate with brown, base radiately marked with narrow brown stripes, often broken into tessellations; sculpture consisting of about four spiral cinguli, of which the middle two are granulose; the upper and lower are wider, smooth or obsoletely granose; base convex, with 6 or 7 concentric narrow feebly granose liræ, the interstices minutely concentrically striate; aperture oblique, rounded rhomboidal, outer lip lirate within, columella and basal lips thickened, denticulate; columella folded above; umbilical area white, false umbilicus very narrow, with a spiral sulcus and fold within.

Alt. 15–17, diam. 14–16 mill.

Indian Ocean; Bombay; China(?).

T. scabrosus PHILIPPI, *Zeitschr. f. Mal.* 1850, p. 190.—*Conchyl. Cab.* p. 292, t. 43, f. 3.—FISCHER, *Cog. Viv.* p. 335, t. 104, f. 2.

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Unfigured, insufficiently described species of Trochus, Polydonta, etc.

P. pallidula A. Adams. (Pl. 42, fig. 6.)

P. testa elevato-conica, albida, maculis luteolis picta; anfractibus planis, cingulis tuberculorum ornata, tuberculis inferne in costas excurrentibus; basi convexa, cingulis granosis ornata, cavitate contorta umbilicum simulante; columella superne soluta, margine tuberculato-dentato; labro intus lirato, inferne denticulato.

AD., *P. Z. S.* 1851, p. 155.—REEVE, *Conch. Icon.*, f. 92.

Habitat unknown.

P. corrugata A. Adams.

P. testa elevato-conica, albida, rufo-fusco variegata; anfractibus planiusculis, sulcis transversis sulcisque obliquis nodoso-reticulatis; inferne oblique costatis, costis nodosis ornatis; basi planiuscula, in medio concava, excavata, umbilicum mentiente; columella superne soluta, margine tuberculato-dentato; labro intus lirato, inferne denticulato. (A. AD., *P. Z. S.* 1851, p. 155.)

Habitat unknown.

P. (Infundibulum) neptuni A. Adams.

P. testa elevato-conica, lateribus convexiusculis, viridi-fusca; anfractibus planis, cingulis granosis transversis ornatis, ultimo angulato, basi planiusculo, cingulis granosis instructo, centro excavato, umbilicum mentiente; columella superne soluta, margine tuberculato-dentato, labro intus lirato, ad marginem intus lævigato.

(A. AD., *P. Z. S.* 1854, p. 132.)

China (Mus. Cuming.)

A greenish brown species, with regular transverse rows of beaded ridges, and with the lateral outlines convex; the color is a uniform greenish brown. (*Adams*.)

P. (INFUNDIBULUM) *ÆMULANS* A. Adams.

P. testa depresso-conica, pseudo-umbilicata, albida, rufo-fusco radiatim picta; anfr. planis, cingulis transversis granulorum ornatis, serie bituberculata ad suturas; basi convexiusculo, rubro radiatim ornata, ac cingulis confertis, concentricis crenulatis instructo; regione umbilicali infundibuliformi, alba; columella superne tortuosa, margine simplice. (A. AD. *P. Z. S.* 1354 p, 132.)

China (Mus. Cuming).

A handsome species, variegated with broad radiating red-brown markings, and with a conspicuous double row of tubercles at the sutures. (*Adams*).

P. (INFUNDIBULUM) *CONCINNUM* A. Adams.

P. testa conica, pseudo-umbilicata, lutescente, fusco-vividoque variegatim picta; anfr. planiusculis, cingulis transversis granulorum, cingulis distantioribus, interstitiis liris moniliformibus ornatis; anfr. ultimo ad peripheriam angulato; regione umbilicali infundibuliformi, albida, basi lævigata, cingulis concentricis articulatis ornata; columella recta, margine simplice. (A. AD., *P. Z. S.* 1854, p. 132.)

China Seas (Mus. Cuming).

This is a small but handsomely variegated species, with the false-umbilicus infundibuliform and of a whitish color, and with the base of the shell adorned with concentric zones articulated with dark brown. (*Adams*).

INFUNDIBULUM *CALIFORNICUM* A. Adams.

I. testa depresso-conica, pseudo-umbilicata, albida, viridi rufoque variegata; anfr. planis, supra angulatis, ultimo angulato, cingulis tuberculorum subdistantium multiformium ornata; interstitiis longitudinaliter oblique costatis, basi concava, cingulis confertis crenulatis inculpta; regione umbilicali infundibuliformi, vividi, linea alba elevata cincto; columella superne tortuosa tuberculata.

(A. AD. *P. Z. S.* 1851, p. 153).

California.

P. MARLÆ A. Adams.

Testa turbinato-conica, granulata, albida, rubro maculata ac flammulata; anfr. convexiusculus, ultimo rotundato, plicato-nodoso, et, ad suturas, corrugato, granulis in seriebus permultis, equalibus, regularibus confertis depositis, basi cingulis granosis exsculpta, cavitare contorta, umbilicum mentiente, cingulo elevato, in dente unico terminato exhibente; labro intus sulcato. (Adams.)

Habitat unknown.

A very beautiful finely granulated species, with the last whorl rounded and having many of the characters of *Claviculus*, [*sic*] thus showing the close affinity of the two genera. (Adams.)

A. AD. P. Z. S. 1855, p. 223.

P. (INFUNDIBULUM) LACERTINUM Gould.

Testa depresso-conica, cinerea et olivaceo variegata; anfr. 10, subconcavis, supernis seriatim granulosis, et ad suturam inconspicuam suberenuatis; ultimo imprimis granulis compressis obliquis seriatim cincto, tunc serie minori, denique ad peripheriam duobus majoribus; basi vix convexo, liris granulosis fusco maculatis inculpto; umbilico lato, polito, nacreo; columella lobato, flexuosa; fauce margaritacea; apertura dolabriformis; labro acuto.

Alt. 25, diam. 25 mill. (GOULD, in *Proc. Bost. Soc. Nat. Hist.* viii, 1861, p. 19).

Hong Kong Harbor.

Resembles *P. hanleyanus* Rve. but has fewer series of granules and is granular beneath. (Gould).

Subgenus CLANCULUS Montfort, 1810.

Clanculus MONTF., *Conch. Systématique*, p. 191.—*Monodonta*, in part, LAMARCK and other authors.—*Fragella* SWAINS., *Shells and shell-fish*, p. 352.—*Otavia* RISSO, *Hist. Nat. Eur. M'rid.*, iv, p. 132, 1826.—*Clanculopsis* MONTEROSATO, *Bull. Soc. Malac. Ital.*, v, p. 222, 1879.

The animal of *Clanculus* bears four pairs of tentacular filaments on the epipodial line. The dentition (*T. pharaonius*, pl. 50, fig. 5.) is similar to that of *Trochus*, but the body of the tooth is more expanded, the centrals and laterals bearing large lateral supporting-wings.

I was at first inclined to treat *Clanculus* as a genus distinct from *Trochus*; but on account of the difficulty of so defining the group that its species may always be distinguished from *Trochus*, and the lack of any tangible anatomical character differing from the latter

genus, I do not see my way clear to make such a separation. Conchologically, such species as *C. villanus* Phil., are very near to *T. scabrosus* Phil., etc.; and finally, when we see that neither the teeth of the columella nor of the outer lip are constant in nearly all the species, nor the form of shell, peculiar umbilicus nor granulated sculpture can be depended on for generic characters, it is clear that the group can have no higher rank than *Tectus*, *Infundibulum*, and other subdivisions under *Trochus*.

As to the grouping of the species I have not been able to discover any mode of division into sections wholly satisfactory to myself. Perhaps the species are best grouped by a division into two sections; *Clanculus* including those with strong basal tooth to the columella, and *Clanculopsis* for species with only a small denticle at the base. Each of these sections may be divided into species with the columella solute or tortuous above, inserted at or near the center of the axis in the bottom of the false umbilicus, and those with the columella inserted upon the edge of the umbilicus, and not deeply entering. Perhaps this last distinction is the more fundamental of the two. There are a number of species which greatly resemble species of *Gibbula* of the section *Eurytrochus*. Of course the resemblance is wholly superficial, as there is no real relationship between the forms.

Section CLANCULUS (*s. str.*)

T. PHARAONIUS Linné. Pl. 15, figs. 54–56.

Depressed conoidal with rounded periphery and profoundly umbilicate axis, very strong and solid, densely granulate, coral red; spire conoidal, its outlines scarcely convex; whorls about 6, somewhat convex, separated by well impressed sutures, the last large, deflected anteriorly, bearing 18 or 19 crowded, closely granose cinguli, of which the 1st, 3d, 5th, 7th, 9th and two upon the base are composed of alternate black and white granules; upon the base the granulation is finer; the base is convex, a trifle indented toward the center; aperture oblique, subtetragonal, peristome with a marginal row of black and white dots; outer lip plicate within, with a short pliciform tubercle above; basal lip, outer margin of the umbilicus and parietal wall provided with wrinkle-like plicæ; columella very oblique, terminating below in a square prominence, contorted above, and inserted on the side of the umbilicus; umbilicus white, and within the strongly radiately plicate marginal rib, smooth.

Alt. 18, diam 23; alt. 16, diam. 18 mill.

Red Sea.

Trochus pharaonius L. *Syst. Nat.*, x, p. 757, no. 506.—(and of authors generally).—*Monodonta pharaonis* WOODWARD, *Man. of Moll.* pl. 10, f. 12.

Specimens of a dark brown color, with alternating brown and black series of granules above are before me.

T. PUNICEUS Philippi. Pl. 15, figs. 59–61.

This form differs from *pharaonius* in being more finely granulate, the last whorl bearing 20 or 21 cinguli, of which the 4th and 9th, as well as one or two upon the base, are articulated with black; balance of shell coral red, or sometimes more or less articulated with white; last whorl more deflected anteriorly than in *T. pharaonius*.

Alt. 18–19, diam. 22–23 mill.

Zanzibar.

Monodonta punicea PHIL., *Zeitschr. f. Mal.*, 1846, p. 100.—*Trochus puniceus* PHIL., *Conchyl. Cab.* p. 73, t. 14, f. 2.—FISCHER, *Cog. Viv.*, p. 167.—*Trochus pharaonis* var. KIENER, *Spec. Trochus*, t. 56, f. 1a.

T. FESTIVUS Tapparone-Canefri. Pl. 14, fig. 18.

Shell elevated-conoid, encircled by granose liræ, base depressed; whorls depressed, slightly tumid below, separated by moderately distinct sutures, ornamented with 5 unequal granulose cinguli on the penultimate, 13 on the last whorl, the interstices sculptured with oblique longitudinal striæ, crossed by nearly obsolete spiral striæ, giving the shell a granulose appearance; umbilicus small, its margin dentate; columella oblique, its edge reflexed, terminating in a plicate tooth below; labrum dentate within, with a conspicuous tubercle above; color rosy-brown, (in specimens worn nearly smooth,) ornamented with rose, black and rarely white granules, except the first and third cinguli, which are unicolorous.

Alt. 12, diam. 14 mill. (*Tapparone-Canefri*.)

Bay of Bias, New Guinea.

Clanculus festivus TAPP-CAN., *Zool. del viaggio della fregata Magenta*, p. 58, t. 1, f. 10. (1874.)

Differs from *T. pharaonius* in the less numerous spiral cinguli (5 instead of 7 on the penultimate, 13 instead of 17–19 on the last whorl,) by the coloration, etc. It is perhaps more nearly allied to the group of *T. stigmatarius* than to *T. pharaonius*. The name *festivus* is preoccupied by Philippi in *Trochus*.

T. LIMBATUS Quoy et Gaimard. Pl. 11, figs. 39, 40.

Shell depressed conoidal, carinate at periphery, umbilicate, whitish or yellowish, maculated with brown, generally with a series of blotches at periphery and beneath suture, the intervening space unicolored or more or less tessellated; base tessellated or radiately flamed; spire low conical, apex acute, smooth; whorls 5 to 6, convex just below the sutures, then flattened, and at the periphery carinated; sutures subcanaliculate; last whorl scarcely descending anteriorly, above with 6 to 8 spiral closely granose cinguli, beneath with 7 to 9 similar concentric cinguli, the interstices both above and below closely, sharply, obliquely, microscopically striate; base slightly convex; aperture tetragonal, oblique; outer lip four or five-lirate within, the upper fold somewhat enlarged, subdentiform; basal margin and marginal rib of the umbilicus finely plicate; columella oblique, nearly straight, its edge reflexed and plicate-dentate; terminating below in a small square denticle, inserted above upon the side of the umbilicus; umbilicus rather wide, funnel-shaped.

Alt. 14, diam. 18 mill.

Adelaide, Victoria, Port Western, Australia.

Trochus limbatus QUOY ET GAIMARD, *Voy. de l'Astrolabe*, iii, p. 245, t. 63, f. 1-6.—PHILIPPI, *Conch. Cab.* p. 212, t. 31, f. 10-12.—FISCHER, *Coq. Viv.* p. 214, t. 71, f. 2.—*T. depressus* ("GMEL.") PHILIPPI, *Conchyl. Cab.*, p. 77, t. 14, f. 6.

The coarser granulation will serve to separate this form from the several following species; the reflexed, crenulated edge of the columella is also characteristic. The basal margin of the aperture is expanded, in fully adult individuals.

T. VARIEGATUS A. Adams. Pl. 14, fig. 19.

Shell depressed-conical, light colored, variegated with reddish brown; whorls tumid above, ornamented with granose cinguli, the interstices longitudinally striate; last whorl acutely angulate; base plane; umbilicus crenulated; columella twisted above, the margin reflexed, crenulated, terminating below in a biplicate tooth; lip lamellarly toothed within, the upper tooth larger. (*Ad.*)

Id. Of Siquijor, under stones. (Cuming).

Clanculus variegatus A. AD. *P. Z. S.* 1851, p. 160, no. 27.—TENISON-WOODS, *Proc. Roy. Soc. Tasmania*, 1877. p. 40.—TAPPARONE-CANEFRI, *Zool. del Viaggio della Fregata Magenta*, p. 57, t. 1, f. 11.

Of this form Tenison-Woods says: A rather thin depressedly conical shell, acutely angulate at the base, which is flat, granular, with oblique microscopic striæ between; pale brownish red; larger than any of our species except the two preceding, 18 to 20 mill. diam. whorls 5. I cannot distinguish this shell from *C. zebrides* of the same author. *Tasmania; S. Australia.*

Tapparone-Canefri has figured this species. The British Museum specimens are said to be more vividly colored than his examples. His figure is copied on pl. 14, fig. 19.

T. UNDATOIDES Tenison-Woods. Pl. 13, figs. 99, 100.

Shell turbinately conoid, rather small, somewhat solid, opaque, reddish rose with indistinct purple spots; whorls $5\frac{1}{2}$, flat increasing rapidly, margined below, girdled with 6 series of rounded granules, of which the lowest line is the smallest, and increasing gradually in size to the suture, which is coronate and broadly canaliculate; the base is flattened, ornamented with 8 spiral lines of close rose colored granules; aperture rhomboid, with a thickened labrum, which is lirate inside; columella with two obtuse, blunt tubercles above and below, and intermediate small obsolete teeth; umbilicus narrow, white, with a rather conspicuous white margin.

Alt. 10, diam. 10 mill. (*Tenison-Woods.*)

Dredged near "Sow and Pigs," Port Jackson N. S. Wales.

Clanculus undatoides, TEN.-WOODS, *Proc. Linn. Soc. N. S. W.* iv, p. 22, (1880.)

In shape and appearance this shell is a little like *C. undatus* Lam., but is smaller and the whorls flat. (*Tenison-Woods.*)

T. MAXILLATUS Menke. Pl. 42, figs. 17, 18.

Shell orbiculate-convex, pale brown, obscurely punctate-articulate, or black, transversely granulate-cingulate; whorls nearly plane, the last subangular, base plane; cinguli above 6, granose, beneath 7, smooth; umbilical cavity with crenate margin; aperture rhomboidal, ringent; outer lip with 6 teeth, the upper one largest; basal tooth of the columella large, obtuse, bifid, three on the columella margin. (*Philippi.*)

Also a very distinct species, allied to *T. corallinus* Gm. by its size, the grains on the margin of the umbilicus, and the large bifid tooth on the end of the columella; but it is more depressed, the base is flat, the granose liræ are narrower, their interstices showing fine oblique striæ under the lens; the teeth inside the outer lip are fewer in

number; finally the edge of the columella shows reflexed blunt denticles, or rather, folds. The color is pale brown, decked with darker dots, or blackish. Alt. 6, diam. 9 mill. (*Philippi*.)

W. Coast Australia.

Monodonta maxillata MENKE, *Spec. Moll. Nov. Holl.*, p. 14.—*Trochus maxillatus* PHILIPPI, *Conchyl. Cab.*, p. 236 t. 36, f. 2.

T. PHILIPPI Koch. Pl. 42, figs. 9–11.

Shell conical, perforate, fuscous, marbled with purple or white, whorls plane, ornamented with a series of nodules at the suture, then 3 or 4 series of granules, the last angulated; base plane, sculpture with 7 rows of granules; aperture rhomboidal; lip lirate within; columella oblique, subsolute above, terminating below in an acute tooth. (*Philippi*.)

The shell is conical, perforate; the whorls are flat, but appear terraced because a nodose carina projects on the upper part, below the sutures; below this there are 2 or 3 minutely granose spiral liræ, and one more strongly granose, forming the angle of the last whorl. The base is flat, and has 7 granose concentric liræ. The angle surrounding the very narrow umbilicus is indistinctly grained. The aperture is rhombic, the fauces sulcate, the columella very oblique, somewhat solute above, terminating in an acute tooth below. The color seems to be quite variable; some examples are brown, with large white spots and dark purplish-red granules, others are reddish-brown, with white and purple granules, etc.

Alt. 11, diam. $12\frac{1}{2}$ mill., or smaller. Perhaps this species is identical with *Monodonta granulata* Gray, (Capt. King's Survey, etc., appendix, p. 47.) (*Philippi*.)

Adelaide, Australia.

T. philippii KOCH, in PHILIPPI, *Abbild. u. Beschreib.*, i. *Trochus*, t. 2, f. 7.—*Conchyl. Cab.*, p. 238, t. 36, f. 4.

T. OMALOMPHALUS A. Adams. Pl. 15, fig. 52.

Shell low conical, acutely carinated at periphery, deeply umbilicate, grayish or brownish, with subsutural and peripheral brown blotches, the carina white and brown articulated, sometimes visible at the sutures, base radiately painted or finely tessellated; spire somewhat slender toward the acute apex; whorls rounded, the last descending a little below the peripheral carina anteriorly, bearing above, 8 to 10 closely finely granulose spiral cinguli, separated by regularly, obliquely and sharply striate interspaces; base concentrically finely

granose-lirate, the liræ 10 to 12, much finer than those of the upper surface; aperture subtetragonal, oblique, outer lip lirate within, slightly plicate-tuberculate near its upper angle; basal lip rounded, expanded, denticulate; columella oblique, a little convex, ending below in a square centrally sulcate tooth, its front margin reflexed and finely denticulate, inserted above upon the side of the umbilicus; umbilicus wide, funnel-shaped, smooth within, margined by a smooth rib. Alt. 10, diam. 14 mill.

Port Jackson, Sydney, Australia.

Clanculus omalomphalus A. AD., *P. Z. S.* 1851, p. 162.—*Trochus homalomphalus* FISCHER, *Coq. Viv.* p. 235, t. 81. f. 2.—WATSON, *Challenger Gasteropoda*, p. 51.

Like the preceding species in coloration, form of spire, base and aperture; but more finely granose both above and below, the umbilicus wider, its margin smooth. *C. omalomphalus* is more acutely carinated than the next species.

T. FLORIDUS Philippi. Pl. 10, figs. 12, 12a. pl. 14, figs. 12, 13.

Shell low conical, subcarinate at the periphery, the carina evanescent toward the termination of the last whorl, deeply umbilicate; color light brown or grayish, striped with rich brown, the markings somewhat interrupted around the middle of the upper surface of the last whorl, the stripes more numerous and narrower at the periphery than upon the upper surface, and continued upon the base, or fading out there, and replaced by dots of brown on a light ground; sutures deeply impressed; whorls about 5, the apical ones acute, pale pink, the following closely granose-cingulate, the last with about 17 to 21 closely beaded cinguli, of which the 8th or 9th usually forms the peripheral angle, all above that being subequal and equally spaced; those of the base are more crowded and finer; the interstices are sharply, finely obliquely striate; body whorl deflected toward the aperture, and appearing gibbous; aperture subhorizontal, subtetragonal; outer lip with a finely plicate thickening or rib within, and a strong tubercle near the upper angle; basal margin expanded, crenulated, and bearing a small but distinct central, very oblique fold within; columella very oblique, with a strong biplicate tooth below, a wide triangular projection at the middle, the whole edge reflexed but not distinctly crenulate as in the preceding two species, the insertion upon the side of the rather wide umbilicus, which has a radiately crenulated marginal rib; parietal wall wrinkled.

Alt. 8–9, diam. 11–12 mill.

Port Jackson, Australia.

Trochus floridus PHILIPPI, *Conchyl. Cab.* p. 243, t. 36, f. 15.—*Zeitschr. f. Mal.* 1849, p. 156.—WATSON, *Challenger Gasterop.* p. 52.—*Clanculus gibbosus* A. AD. P. Z. S. 1851, p. 162.—FISCHER, *Cog. Viv.* p. 237, t. 81, f. 3.

This form may be distinguished from the preceding by the nearly round periphery; the outer lip is much depressed and straightened, producing a very oblique aperture; the sutures are profoundly impressed; the granulose cinguli of the upper surface are equal, and separated by sharply crispate interstices.

T. ANUS Philippi. Pl. 14, figs. 34-36; pl. 11, figs. 43-45.

Shell low-conic, solid, subangulate at periphery, with a rather wide umbilical excavation, whitish, maculated with brown below the sutures, the remainder of the shell tessellated, black and white, pinkish or yellowish toward the apex; whorls 5 to 6, somewhat convex, spirally granose-lirate, the liræ 5 or 6 on the penultimate, 12 or 13 on the last whorl, of which the 6th is at the periphery; the finely beaded liræ are separated by minutely spirally and obliquely striated interstices as wide as the ridges; the body-whorl is a little deflected anteriorly, flattened and excavated in the center beneath; the aperture is contracted, very oblique, tetragonal; the upper lip is straight, with a strong tooth midway between its insertion and the outer angle of the aperture; the outer and basal lips are well curved, thickened and plicate-denticulate within; the columella is very oblique, its edge reflexed and bearing 4 or 5 large tubercles, one at its insertion; terminating below in a strong quadrangular bifid tooth; parietal tract bearing strong white wrinkles; umbilical excavation penetrating but little deeper than the insertion of the columella, its border plicate-denticulate. Alt. 9-11, diam. 12-15 mill.

Australia.

Trochus anus PHIL., *Zeitschr. f. Mal.*, 1848, p. 101.—*Conchyl. Cab.* p. 266, t. 39, f. 7.—FISCHER, *Cog. Viv.* p. 324, t. 101, f. 3.

This species is allied to *T. floridus*, etc, but differs in the shallow umbilicus, very heavy columellar teeth and coarser sculpture. In the form of the aperture anus is very similar to *floridus*; like that species, it is nearly horizontal, and obstructed by large teeth. *T. limbatus* is more strictly conical, with less developed teeth than anus, and has a more deeply perforating umbilicus. *T. clanguloides*, with equally strongly developed teeth, is far more finely sculptured, and has a deeply entering columella.

T. FLAGELLATUS Philippi. Pl. 19, figs. 3, 4.

Shell conoid, umbilicate, granulate, white, painted with branching stripes of reddish purple; whorls convex, the last rounded; base convex, white; penultimate whorl with six series of granules, the interstices wide as the ridges, obliquely striate; last whorl with eight series of granules above, nine on the base; columella oblique, solute above, the edge rugose-denticulate, terminating below in a prominent tooth; outer lip rugose and dentate within.

The whorls are pretty convex, especially above; the last is rounded, deflected anteriorly and flattened; the penultimate whorl has six series of granules, which are the same width as their densely striate interstices; the last whorl however has eight, two new ones having been intercalated on the lower part, the eighth prominent, forming the periphery. The base is rather convex, and has nine close granulose liræ. The granules on the border of the umbilicus are but slightly developed. The aperture is about as in *T. pharaonius*. The color white, with numerous dark rose-red radiating, sometimes branching stripes above. Alt. 10, diam. 15 mill.

Habitat unknown.

Separated from *T. personatus* and *T. anus* by the more numerous liræ of the base; from *T. morum* by the convex base, etc.

Trochus flagellatus PHIL., *Zeitschr. f. Mal.* 1848, p. 105.—*Conchyl. Cab.* p. 267, t. 39, f. 9.

This is a species which I have not been able to identify. It is evidently closely related to *T. floridus*. Philippi's description and remarks are translated above, and his figures copied on my plate.

T. MORUM Philippi. Pl. 14, figs. 31, 32.

Shell conical, umbilicate, granulate, flesh-colored, at the sutures and around the periphery rufous-maculate; whorls planulate, the last acutely angulate, with 6 series of granules, the interstices wide as the ribs, obliquely striate; base flat, with 10 granose liræ; columella oblique, contorted above, the margin reflexed, crenulate, terminating below in a bifid tooth; lip dentate and rugose within; the superior tooth large; umbilical margin crenulate.

The shell is pretty regularly conical, and consists of 6 to 7 slightly convex whorls, of which the upper are angulated in the suture, the last rather sharply carinated at the periphery, scarcely deflected anteriorly, and flattened toward the aperture, as in the other species

of the section Clanculus. The granules of the upper surface are hemispherical, regular, rather separated, and stand in 6 rows; on the base they are less distinct and in 10 rows; the interstices are as wide as the granules; the close incremental striæ with which they are marked give them a very pretty appearance. The aperture and umbilicus show nothing characteristic. Alt. 12, diam. 17 mill.

Habitat unknown.

Distinguished from *T. anus* and *T. personatus* by the number of liræ on the base; from *T. flagellatus* by the flat base, sharply carinated last whorl, etc.

T. morum PHIL., *Zeitschr. f. Mal.* 1848, p. 109.—*Conchyl. Cab.* p. 265, t. 39, f. 5.

Another species autoptically unknown to me, and not mentioned by authors except Philippi. His description and remarks are above translated in full. Compare *T. floridus*, *T. clangulus* and the forms mentioned by Philippi.

T. PERSONATUS Philippi. Pl. 14, figs. 29, 30. pl. 19, figs. 91, 92.

Shell low conical, heavy, solid, umbilicated, carinated, white, or suffused with a faint rose tint, with a series of small rose-colored maculations above the periphery and sometimes at the suture, base white or faintly marked with rose around the outer border; whorls about 5, slightly convex, separated by subcanaliculate sutures; outlines of spire a little convex; first two whorls smooth, eroded, the following granose-lirate, the penultimate with 5 or 6, the last with 11 or 12 series of very distinct rounded granules, the 5th or 6th forming the periphery, the interstices decussated by fine oblique and spiral striulæ, which are sometimes obsolete; last whorl carinated at the periphery, slightly deflected toward the aperture, and much flattened there; base a trifle convex, the middle portion concave toward the umbilicus; aperture tetragonal, very oblique, the upper lip straight, bearing a strong tubercular tooth midway; outer and basal lips well rounded, thickened and plicate-denticulate within, the basal margin decidedly expanded and curved; columella very oblique, concave toward the insertion, its edge scarcely reflexed, simple, bearing a single triangular projection or tooth below the middle, and terminating in a very strong, quadrate, biplicate tooth at base; parietal wall wrinkled; umbilicus penetrating deeper than the insertion of the columella, bordered by a plicate rib.

Alt. 10, diam. 14; alt. 10, diam. 12 mill.

Australia.

Monodonta ringens PHILIPPI, *Zeitschr. f. Mal.* 1846, p. 99. (not *M. ringens* MKE, also a species of *Clanculus*.)—*Trochus personatus* PHIL., *Conchyl. Cab.* p. 78, t. 14, f. 7. (about 1847.)

This species is allied to *T. anus* Phil. but differs in the deeper umbilicus, the smooth, not tuberculate edge of the columella, the stronger development of the teeth, more distinct granulation, and other characters. The aperture is almost horizontal; the umbilicus and aperture are both narrower than in *T. anus*. The peristome is much thickened inside.

T. OCHROLEUCUS Philippi. Pl. 13, figs. 95, 96.

Shell conoidal, umbilicate, isabella-colored, sculptured with very fine subgranose liræ, about 11 on penultimate, 40 on last whorl; whorls rather convex, the last scarcely angled; margin of the umbilicus dentate; columella very oblique, not solute above, terminating below in a simple denticle; lip thickened and corrugated within.

The form is just like *T. vieilloti* Payr.; the shell consists of 6 to 7 rather rounded whorls, the last one not angulated to speak of, and with a rather convex base. The spiral cinguli gradually increase in number, so that on the penultimate there are about 11, on the last whorl about 40 of them. On the upper whorls they are distinctly granulose, on the last almost entirely smooth. The umbilicus is pretty narrow, its margin dentate; the columella is very oblique, not free above, with a small but prominent denticle below; the outer lip is thickened within, with five folds, but near the edge with numerous wrinkles. The color is isabella-yellow.

Alt. 8, diam. 12 mill. (*Philippi*.)

Habitat unknown.

Trochus ochroleucus PHILIPPI, *Conchyl. Cab.* p. 243, t. 36, f. 16. (after 1853.)

T. CLANGULUS Wood. Pl. 10, figs. 5–7.

Shell conical, with decidedly higher spire generally than *C. floridus*, subcarinate, nearly rounded at the periphery, very deeply umbilicated; color brownish, or, more frequently a beautiful emerald green, much paler below, the upper surface broadly radiately maculate with crimson, the flames not extending below the periphery, which, with the base, is dotted with the same shade; spire usually attenuated toward the acute rose-colored apex; whorls about 6, convex, the last deflected anteriorly, spirally sculptured with about 18

closely granose cinguli, of which 5 to 8 principal ones are above the periphery, their interstices bearing granose riblets, and sharp oblique striae; on old individuals the disparity in the size of the liræ of the upper surface is often scarcely apparent; the base bears much finer, closer, granulose liræ; aperture very oblique, subtetragonal, outer lip plicate within, the tooth near the superior angle but slightly developed; other details of aperture and umbilicus as in the *T. personatus*, save that the parietal area is scarcely wrinkled.

Alt. 12, diam. 13; alt. 10, diam. $12\frac{1}{2}$ mill.

Port Jackson, Australia.

Trochus clangulus WOOD, *Ind. Test. Suppl.* t. 5, f. 31. 1828.—PHILIPPI, *Conchyl. Cab.* t. 36, f. 8.—FISCHER, *Coq. Viv.* p. 234, t. 81, f. 1.

This form is closely allied to *C. floridus*; differing in the lesser development of the superior tooth of the lip, the smoother parietal area, and (typically) the greater altitude. *C. floridus*, too, has much deeper sutures, rounder whorls, and, especially, the ribs of the upper surface are equal, whilst in *C. clangulus* they are alternately large and small.

In the obsolescence of the superior tooth of the aperture, this species forms a transition from the preceding to the following group of species; which, whilst closely allied to the foregoing, differs in the less developed teeth within the aperture.

..*

T. MINIATUS Anton. Pl. 10, figs. 23, 24; pl. 14, figs. 24, 25.

Shell conical, carinated at the periphery, deeply umbilicated, painted with crimson and brown radiating bifurcating stripes above, the apical whorls crimson, the base convex, radiately strigate or finely tessellate with brown; whorls about 6, subplanulate, but with a slightly salient central carina above, spirally finely granose-lirate, the liræ narrow, close, about 8 to 12 in number on the upper surface of the last whorl, the 5th forming a slightly projecting carina; base finely lirate, the liræ granose, about 15, subequal, or sometimes alternately smaller, the interstices radiately striate; aperture rather large, subrhomboidal, the outer lip lirate within, base crenulate, expanded; columella long, straight, strongly dentate at base, obsoletely folded above, inserted upon the side of the umbilicus, which is smooth within, bordered by a slight, smooth rib.

Alt. $12\frac{1}{2}$ –15, diam. 15–17 mill.

South African Coasts.

T. miniatus ANTON, *Verzeich.*, p. 58, 1839.—PHILIPPI, *Conchyl. Cab.*, p. 99, t. 16, f. 10.—FISCHER, *Coq. Viv.* p. 212, t. 83, f. 1.—*Clanculus carinatus* A. AD., *P. Z. S.* 1851, p. 162.

In its conical form, densely granose-lirate sculpture and the carina in the middle of the upper surface of the whorls, this form is quite distinct.

VAR *CARINATUS* A. Adams. Pl. 14, fig. 24, 25.

A form which differs slightly from the type in its somewhat greater altitude; the peripheral carina of the penultimate whorl is exserted; the coloration consists of short alternate crimson or brown dashes below the suture, and brown tessellations on a white ground in the center of the base, the intervening space unicolored, brown, save the carina, which is articulated with white.

Alt. 15, diam 16 mill.

Algoa Bay, Australia.

T. *ALOYSII* Tenison-Woods. Pl. 14, figs. 20–23.

Shell small, conical, carinated, umbilicated, whitish or corneous, marked above with zigzag radiating stripes (sometimes broken into dots) of sepia or black, below unicolored white or sparsely dotted with black, peripheral carina ornamented with a series of black spots; spire rather straightly conical, apex acute, whorls about 6, separated by subcanaliculate sutures; upper surface spirally sculptured with about 6 coarse, conspicuously granose liræ, of which the first and the sixth (or peripheral) are most prominent; base slightly convex, bearing 6 to 7 concentric, coarse, conspicuously granose separated liræ; aperture rhomboidal, outer lip iridescent and plicate within; basal margin rounded, denticulate; columella oblique, nearly straight, slightly folded above, bidentate at base; umbilicus with (in fully adult specimens) a crenate marginal rib, white within, and perforating scarcely deeper than the insertion of the columella.

Alt. 8–9. diam. 9–11.

Tasmania.

Clanculus aloysii TEN.-WOODS, *Proc. Roy. Soc. Tasmania*, 1875, p. 155.

A small species, quite distinct in the black and white coloration.

T. *DOMINICANUS* Tenison-Woods.

Shell small, depressed, turbinate, broadly umbilicate, rather solid, bluish brown and obscurely spotted and clouded; whorls 6, rather

convex, and obliquely neatly and thickly striate, striæ passing over the liræ but not over the granules; aperture obliquely quadrate; lip thickened within, throat pearly; columella obsoletely unidentate, subreflected; umbilicus white, smooth; base flattened, spirally and smoothly lirate. Differs from known species in the smoothly lirate base and the absence of tubercles around the lip, columella or umbilicus. (*Tenison-Woods*). Alt. $7\frac{1}{2}$, diam. maj. 10, min. 8 mill.

S. coast Tasmania.

Clanculus dominicana T.-WOOD, *Proc. Roy. Soc. Tasm.*, 1876, p. 144. (1877.)

This species and the three following are known to me only by the original descriptions.

R. RAPHAELI Tenison-Woods.

Shell small, depressedly conical, rather solid, blackish olive, but tessellated with white at the sutures; whorls 4 to 5, flattened, girdled with irregular spiral granulose liræ, sometimes alternating and sometimes with minute granulose lines intervening, granules larger at the margins; shell universally covered with minute transverse oblique lines; last whorl subacutely angular at the periphery; suture canaliculate; base flattened, ornamented with spiral granulose lines and oblique striæ; umbilicus white; aperture quadrate, silvery, pearly, conspicuously lirate; columella wide, conspicuously tuberculate anteriorly; lip dentate. (*Tenison-Woods*).

Alt. 6, diam. maj. 6, min. $5\frac{1}{2}$ mill.

George's Bay and Long Bay, Tasmania.

C. raphaeli TEN.-WOOD, *loc. cit.*, p. 144.

T. ANGELI Tenison-Woods.

Shell small, turbinate, depressed, orbicular, rather solid, sordid white and clouded red, irregularly keeled all over, with the interstices finely, irregularly, neatly obliquely lirate, and peculiarly punctate; larger keels smooth or obsoletely granular; whorls 5, convex, the last obtusely angular; base flat or slightly convex and spirally lirate with equal liræ and spotted brown, interstices transversely neatly striate; aperture subquadrate, lip closely dentate, throat conspicuously lirate; columella obtusely unidentate; margin of the umbilicus regularly tuberculate with rounded granular tubercles.

Alt. 5, diam. maj. 6, min. $5\frac{1}{2}$ mill. (*Tenison-Woods*.)

Long Bay (in 10 fms.); Blackman's Bay, Tasmania.

C. angeli T.-WOODS, *loc. cit.*, p. 144.

T. PHILOMENÆ Tenison-Woods.

Shell depressedly conical, white; whorls 5, at the suture canaliculate, concave, with both margins beaded, within the margins 3 to 4 lirate; liræ ornamented with round shining granules, interstices very finely obliquely striate; last whorl acutely angulate and margined; base flat, spirally granulosely lirate; aperture obliquely squared; outer lip lirate within; columella unidentate and corrugated; umbilical margin spirally dentate.

Diam. 11, alt. 10 mill. (*Tenison-Woods*).

Tasmania.

Clanculus philomenæ TEN.-WOODS, *Proc. Roy. Soc. Tasm.* 1875 p. 155.

One specimen. A very distinct white shell with moniliferous whorls rising in stages. (*Tenison-Woods*).

I have not seen this species. It is evidently closely related to the preceding.

T. YATESI Crosse. Pl. 10, fig. 13; pl. 14, fig. 33.

Shell conical, very solid, angulate at the periphery, with a very shallow umbilicus; white, variegate with maculations and radiating zigzag stripes of purplish red; whorls 5, planulate, turgid below the subcanaliculate sutures, the apical ones when not eroded spirally striate, the following granose-lirate, the last bearing on its upper surface five coarse beaded liræ, the fifth forming the periphery; base slightly convex, bearing six beaded liræ; interstices between the liræ finely obliquely striate; aperture rounded-tetragonal, pearly within; outer lip lirate within; basal lip curved, subdenticulate; columella short, hardly perceptibly folded above, dentate below; umbilicus perforating scarcely deeper than the insertion of the straight columella. Alt. 8, diam. 11; alt. 10½, diam 11 mill.

Gulf of St. Vincent, S. Australia.

Clanculus yatesi CROSSE *Journ. de Conch.* 1863, p. 379, t. 13, f. 1.
—FISCHER, *Cog. Viv.* p. 399, t. 118, f. 4.

A solid little species, allied to the preceding, but differing in coloration etc. The specimens before me exceed the types in altitude. A variety from Tasmania is of a uniform deep purple color. (pl. 14, fig. 33.) It may be called var. *PURPURATUS*.

T. DUNKERI Koch. Pl. 14, figs. 26, 27; pl. 15, figs. 57, 58.

Shell imperforate, having a little hollow or depression at the place of the umbilicus, orbicularly conoid or subdepressed, thick, solid;

whorls 5, the first whitish, often eroded, the last brownish, purplish or red, obliquely striated, and ornamented with spiral granulose liræ, 3 on penultimate, 8 or 9 on last whorl, of which the first is composed of larger beads, and the fourth forms the periphery, the interstices about as wide as the liræ; last whorl somewhat gibbous and descending toward the aperture, which in adult specimens is somewhat contracted and subtrigonal, outer lip with a few deeply entering liræ within, the upper one terminating in a small denticle; columella short, concave, smooth, terminating in an acute narrow denticle, which is separated from a similar smaller tubercle on the base by a narrow notch. Alt. 8, diam. 11; alt. 8, diam. 9; alt. 9, diam. 11–13 mill.

Adelaide, Cape Riche, St. Vincent's Gulf, S. Australia; Port Philip, Melbourne, Bass, Straits.

T. (Monodonta) dunkeri KOCH, in PHILIPPI, *Abbild. u. Besch. neuer Conchyl.*, i pt. 3, p. 67, t. 2, f. 5. 1843.—PHILIPPI, *Conchyl. Cab.*, p. 237, t. 36, f. 5.—(*Clanculus rubens* ("A. AD.") ANGAS, *P. Z. S.* 1865, p. 178.—TENISON-WOODS, *Proc. Roy. Soc. Tasmania*, 1878, p. 40.—*Trochus dunkeri* FISCHER, *Coq. Viv.*, p. 361, t. 96, f. 2, (1880).—BRAZIER, *Proc. Roy. Soc. Tasmania*, 1886, p. 202.

The typical form of this shell is shown in figs. 26, 27 of pl. 14; the figures and description given by Fischer are of a depressed variety. In several specimens measured by me the altitude is nearly equal to the diameter. The synonymy was first worked out by Mr. BRAZIER, from whose excellent description the first lines of my own are quoted. This shell is allied to the *T. yatesi*, but is more solid, more compact, and less carinated at the periphery; its spiral liræ are fewer than in that species. The umbilicus is remarkably shallow for a *Clanculus*.

The two following species are similar to certain forms of the section *Clanculopsis* in lacking a distinct tubercle at the base of the columella; I am however inclined to group them with the preceding species, which they resemble in general aspect.

T. GUINEENSIS Gmelin. Pl. 10, figs. 3, 4.

Shell conical, very solid, rather depressed, angulate at the periphery, deeply umbilicate, whitish, painted with broad radiating purplish brown stripes above, base with narrow radiating stripes or tessellations of the same shade; whorls about 6, planulate or slightly concave above, the apex whitish, eroded, the succeeding whorls spirally beaded, the last whorl slightly descending anteriorly, bearing on

the upper surface about 7 spiral beaded liræ, the interstices obliquely finely striate; base subplanulate, concentrically sculptured with about 7 or 8 beaded liræ; aperture rounded rhomboidal, the outer and basal lips thick, evenly and finely plicate within; columella oblique, deeply entering, conspicuously folded near its insertion, its edge denticulate near the base, and passing into the basal margin with a regular curve; parietal wall bearing a white wrinkled callus, the umbilical margin of which is dentate; umbilicus wide, deep, scarcely narrowed as it penetrates, bordered by a strong acutely dentate rib. Alt. 13-16, diam. 18-20 mill.

Guinea; Gaboon; Liberia.

Trochus guineensis GMEL. *Syst. Nat.* xiii, p. 3574, no. 49, 1788.—PHILIPPI, *Conchyl. Cab.* p. 79, t. 14, f. 9.—FISCHER, *Coq. Viv.* p. 221, t. 72, f. 3.

This species, together with *T. villanus* constitutes a group which differs from the typical forms of *Clanculus* in lacking the strong tooth at the base of the columella.

T. villanus Philippi. Pl. 11, figs. 58, 59; pl. 14, fig. 28.

Shell conical, very solid, cinereous-olive or purplish, lighter beneath, sparsely dotted with black; whorls about 6, slightly convex, spirally liræ, the last encircled by about 14 granose separated liræ, of which about 6 are on the upper surface, their interstices bearing spiral striæ; last whorl obtusely angular at the periphery, slightly convex beneath, a little descending anteriorly; aperture rounded-tetragonal, outer and basal lips plicate within, columella as in *T. guineensis* but longer; umbilicus narrow, deep, parietal wall slightly calloused, wrinkled. Alt. 22, diam. 22 mill.

W. African coasts; Guinea; Gold coast; Gaboon.

Mondonta villana PHILIPPI, *Zeitschr. f. Mal.* 1846, p. 101.—*Trochus villanus* PHIL. *Conchyl. Cab.* p. 74, t. 14, f. 3.—FISCHER, *Coq. Viv.* p. 220, t. 72, f. 2.

More elevated than *T. guineensis*, less carinated at the periphery, and with narrower umbilicus. The parietal callus is much heavier in *T. guineensis*.

T. MAUGERI Wood. Pl. 10, figs. 25-27.

Shell conical, with nearly straight sides carinated, solid, thick, false-umbilicate, reddish or yellowish brown, more or less dotted minutely with a slightly darker shade; whorls about 8, flat above, the sutures scarcely marked; the first whorls of the apex when not smooth by erosion are spirally lirate, the liræ dotted with red; succeeding whorls very closely, finely granulate in spiral series, the last whorl with about 7 rows of granules above, carinate at the periphery, slightly deflected anteriorly; base nearly flat with numerous (15 to 20) close finely beaded concentric lirulæ; aperture very oblique, tetragonal; upper lip straightened, wrinkled within; outer and basal lips thick, curved, crenulate within; columella very oblique, its edge denticulate, slightly tortuous above, and inserted in the center of the axis, below terminating in an acute or squarish narrow tooth; parietal wall and umbilicus rugose, the latter bounded by a plicate-denticulate rib. Alt. 20-25, diam 25 mill.

Port Jackson, Australia.

T. maugeri WOOD, *Ind. Testaceo. suppl.* t. 5, f. 27a, p. 220.—PHILIPPI *Conchyl. Cab.*, t. 36, f. 9.—FISCHER, *Coq. Viv.* p. 218, t. 72, f. 1.

A handsome species, formerly very rare. The form is more strictly conical than usual in *Clanculus*. The fine granulation nearly uniform, color, minutely dotted with darker and beneath usually with white, are characters separating *maugeri* from other species. The specimens before me are from Port Jackson, collected by Brazier.

T. NODULOSUS A. Adams Pl. 13, fig. 3.

Shell turbate-conoid, imperforate, whitish, variegated with red; whorls transversely sulcate, ornamented with granose cinguli, above with a coronal series of tubercles; suture canaliculate; last whorl spirally sulcate, at the periphery tuberculate, the base rather flat-tend, concentrically granose-lirate; columella solute above, tortuous, anteriorly tuberculate; margin of the umbilicus crenulated; lip transversely sulcate within, margin dentate-lirate. (*A. Ad.*)

Tasmania, (Cuming.)

Clanculus nodulosus A. AD. *P. Z. S.* 1854, p. 39, t. 27, f. 2.

This species has most of the characters of a *Clanculus*, but the whorls are nodulous and not granular. (*Adams.*)

The species has not been noticed by Tasmanian nor Australian conchologists.

T. UNDATUS Lamareck. Pl. 40, figs. 1, 2.

Shell large, depressed conoid, excavated, false-umbilicate in the center beneath, cinereous or rose colored, radiately striped with brown or black, the stripes sometimes broken into irregular maculations, especially on the base; whorls about 6, convex around the upper part, then flattened, obtusely angulate at the periphery, the base flattened, concave toward the center; sutures subcanaliculate; apex acute, eroded; following whorls finely granose in spiral series, of which there are 10 to 12 on each whorl; last whorl somewhat deflected anteriorly, bearing about 30 spiral granose ridges, very close and fine upon and below the periphery, coarser above and around the umbilicus, the interstices obliquely striate; aperture oblique, tetragonal, outer and basal lips thickened and plicate within; columella oblique, inserted nearly in the bottom of the broad umbilical excavation, its edge reflexed and bearing about 10 denticles, twisted near the insertion, terminating below in a simple tooth; parietal tract wrinkled; umbilicus with a plicate border, and in the middle a strong, sometimes crenulate, spiral funicle.

Alt. 18-22, diam. 28-35 mill.

S. Australia; Tasmania.

T. undatus LAM. *An. sans. Vert.*, vii, p. 28, no. 61 (1822).—FISCHER, *Cog. Viv.*, p. 168, t. 56, f. 2.—PHILIPPI *Conchyl. Cab.*, t. 33, f. 4.—*Monodonta undata* LAM. *Encyc. Méth.*, t. 447, f. 3.—*Trochus smithii* WOOD, *Ind. Test.*, Suppl. t. 5, f. 20a.

The largest and one of the most beautiful species of *Clanculus*. It is apparently more nearly allied to *T. maugeri* than to any other species of the genus.

T. PUSILLUS H. Adams. Pl. 43, fig. 6.

Shell trochiform, solid, encircled by granose liræ, alternately minute, the interstices densely obliquely striate; rosy, marked with white maculations; suture canaliculate; whorls 6, convex; the last convex beneath, with granose concentric liræ; umbilicus crenulated, white; aperture diagonal, subcircular; columellar tooth prominent, compressed; lip simple, sulcate within. (*Adams.*)

Alt. 5, diam. 7 mill.

New Hebrides.

Clanculus pusillus H. AD., *P. Z. S.*, 1873, p. 207, t. 23, f. 9.

T. CLANGULOIDES Wood. Pl. 10, figs. 10, 11.

Shell globose-conic, very solid, deeply, narrowly false-umbilicate, fawn colored, lighter beneath and roseate at the apex, sharply

granose-lirate, usually with every second rib articulated with dots of white or black or both; whorls about 6, the upper ones nearly flat, the penultimate and last convex, the former with 7 or 8 spiral distinctly granose liræ, the last with about 18, of which the 7th usually is upon the periphery, interstices finely obliquely striate; last whorl deflected anteriorly, rounded at the periphery; base somewhat convex; aperture oblique, small, contracted; outer lip bearing within a strong tooth above, and an inconspicuous rather acute thread at the place of the periphery; basal lip expanded, curved, slightly denticulate; columella very oblique, slightly tortuous above and very deeply entering, terminating below in a strong plicate, tooth, and with a smooth margin, save for a small denticle immediately above the basal tooth; parietal tract wrinkled; umbilicus with a plicate-denticulate border. Alt. 10-12, diam. 12-15 mill.

Australia, Port Jackson; Watson's Bay; New Caledonia; Viti Is.

T. clanguloides WOOD. *Ind. Testaceo. suppl.*, t. 6, f. 39.—FISCHER *Cog. Viv.*, p. 369, t. 113, f. 2.

In the typical form, the 1st, 3d, 5th, 7th and 9th liræ, and one or two upon the base are articulated with black. A tray of specimens from the Viti Islands, received from the late Andrew Garrett, differ in having only the 3d and 7th liræ, and one upon the base so marked. I need not compare *clanguloides* with *T. personatus* and its allies,—species with similar strongly developed teeth—for the deeply entering columella of the present species at once separates it.

T. ROBERTSI Pilsbry. Pl. 13, fig. 4-7.

A form similar in color-pattern and sculpture to *T. clanguloides*, but differing notably in the greater altitude, more turbinate form, and greater development of the teeth; in these characters it is like *T. stigmatarius*, which is, however, quite different in coloration. The spire is elevated conical, the apex tinged with orange; the upper whorls are nearly flat, separated by a linear suture, which becomes more deeply impressed at the last whorl; the body-whorl is slightly convex, rounded at the periphery, deeply deflected and flattened toward the aperture; the base is rather flattened, about as in *T. clanguloides*; the sculpture consists of spiral series of closely set rounded granules, the series or cinguli a little separated on the upper surface, closer beneath; these number 17 or 18 upon the last whorl, the 7th being upon the periphery, just as in *T. clanguloides*; the interstices between liræ are finely obliquely and spirally striate, the

spiral striae often a little difficult to distinguish; this gives the interstices at times a granulate appearance under the lens. The aperture is nearly horizontal, tetragonal; superior lip straightened, bearing a very large sub-bifid squarish tubercle in the middle; place of the periphery marked inside by an entering lamellar fold; basal margin curved, slightly expanded, bearing two or three fold-like denticles inside, edge minutely denticulate; columella oblique, deeply entering the narrow umbilicus and inserted in the center of the axis, slightly dentate above, bearing a narrow tooth below the middle, and terminating in a large, heavy bi- or triplicate tooth; parietal area covered by a white callous bearing numerous wrinkles, one or two of which enter the aperture; umbilicus surrounded by a radiately strongly plicate callous. Coloration as in *T. clanguloides*.

Alt. $12\frac{1}{2}$, diam. 13; alt. 11, diam. 11 mill.

Red Sea. (Dr. Beadle.)

On old specimens the compression and deflection of the last whorl gives the shell a bullet shape. The aperture is like *stigmatarius*, coloration and sculpture like *clanguloides*. In this combination of characters the species is quite distinct. Similar specimens marked *Lord Howlands Id.* are before me. The species is named in honor of Mr. S. RAYMOND ROBERTS, author of the Monograph of *Cypræidae* in the *MANUAL*.

T. largillierti Philippi. Pl. 11, figs. 51, 51.

Shell perforate, conoid, apex acute; whorls $6\frac{1}{2}$, the first rosy, following whorls convex, grayish, spotted with white and black at the narrow sutures; spirally lirate, liræ granulose, numerous, 8 to 10 on the penultimate whorl; last whorl rounded, concentrically lirate beneath, liræ 8 to 10, gray and brown articulated; aperture oblique, rhomboidal, lip dentate above; basal margin plicate, columella oblique, dentate at base; parietal callous wrinkled; umbilicus bordered by strong white plicæ. Alt. 14, diam. 16 mill. (*Fischer*.)

Habitat unknown.

T. largillierti PHIL., *Zeitschr. f. Mal.* 1848, p. 109.—*Conchyl. Cab.* p. 265, t. 39, f. 6.—FISCHER, *Coq. Viv.*, p. 216, t. 71, f. 3.

T. flosculus Fischer. Pl. 11, figs. 56, 57.

Shell narrowly perforate, conoid, thick, apex acute; whorls $7\frac{1}{2}$, the first rosy, smooth, the rest convex, separated by linear sutures, spirally lirate, the liræ granose, 6 on the penultimate whorl, of which the 1st, 3d, 5th are entirely reddish, the 2d, 4th, 6th composed

of alternating white and black granules; last whorl globose, bearing 15 or 16 liræ, somewhat convex beneath, the concentric liræ uniform yellowish-brown, often in pairs, separated by single alternately white and black articulated liræ; aperture oblique, rhomboidal; lip thickened, plicate, dentate above, columella oblique, terminating in a large, plicate, contorted, truncate tooth; umbilicus profound, narrow, its border crenulated; parietal callous wrinkled.

Alt. 11, diam. 11 mill. (*Fischer.*)

Seychelles Is.

T. rarus (Dufo) FISCHER, *Sp. et Icon. genre Trochus*, t. 96, f. 1.
—*T. flosculus* FISCHER, *Coq. Viv.*, p. 300, t. 96, f. 1. (1880.)

This form was at first identified by Dr. Fischer with the *T. rarus*, of Dufo (*Ann. des. Sc. Nat.* 2e. Sér. xiv, 1840, p. 188). This form, however, cannot be certainly determined from Dufo's miserable description, and had better be dropped altogether; or, as Fischer suggests, be relegated to the synonymy of *T. pharaonius*.

T. MARGARITARIUS Philippi. Pl. 13, fig. 90.

Shell conical, umbilicate, ornamented with granose cinguli (about 7 on penultimate whorl), brown, the 2d and 4th cinguli ornamented with black, 6th and 7th with alternating brown, white and black granules; margin of the umbilicus dentate; columella solute above, terminating in a plicate tooth below; lip dentate within.

The grains of the second and fourth rows are much smaller than the rest, and are formed of alternating white and black grains. The base shows 10 concentric rows of granules, in which every fourth granule is black. The aperture and the umbilicus are formed just as in *T. pharaonius*. In all varieties the ground-color is a dirty flesh-color, and alternating series of granules white and black articulated. Alt. 12, diam. 14 mill. (*Philippi.*)

Monodonta margaritaria PHIL., *Zeitschr. f. Mal.* 1846, p. 100.—*T. margaritarius* PHIL., *Conchyl. Cub.*, p. 74, t. 14, f. 4.

Philippi quotes as possibly the same as *margaritarius* the figure of *T. clangulus*, in Wood's *Index Test.* It is not that species, however. It may be allied to *stigmatarius*.

T. AMENUS Koch. Pl. 42, figs. 19, 20.

Shell elevated conical, false-umbilicate, granulate; whorls plane, the last rounded-angulate; granose cinguli 4 or 5, first and third pale pink, second, fifth and basal (6 to 7) cinguli whitish, every

fourth granule brown; aperture rhomboidal, lip smooth within; columella oblique, solute above, terminating below in a strong tooth, margin reflexed. (*Philippi*.)

Allied to *T. pharaonius*. The shell is elevated conical, with a rounded angle on the periphery, the base elevated but not rounded. The whorls are about 8, the uppermost forming a rosy apex, pretty smooth, the following elegantly encircled by series of granules, actually 12 in number, but only 4 shown upon the upper whorls, the suture running upon the middle of the fifth. The interstices are somewhat narrower than the ridges, and under a lens are seen to be finely, densely, obliquely striate. The first and second rows of granules are pale flesh-colored; the rest have regularly 3 white granules, then a brown one. The aperture is rhombic, with rounded outer portion. The outer lip is thickened within, but simple, smooth; the columella oblique, solute above, its edge reflexed, below ending in a strong tooth, near which is a denticle. The false-umbilicus is rather narrow, with smooth margin.

Alt. $8\frac{1}{2}$, diam. $7\frac{1}{2}$ mill. (*Philippi*.)

Habitat unknown.

T. amoenus KOCH in PHILIPPI, *Conchyl. Cab.*, p. 100, t. 16, f. 1.

I have seen nothing in nature or the books like this form. The lack of folds within the outer lip is different from the numerous species of *Clanculus* having similar elevated conical form.

T. STIGMATARIUS A. Adams. Pl. 15, fig. 53; pl. 19, figs. 5-8.

This is a globose-conoid, solid, false-umbilicate species, very similar to *T. clanguloides*, but differing in the following characters: It is more solid, more elevated, somewhat the shape of a Minie ball. There are 6 to 7 whorls, the sutures somewhat impressed; the penultimate is encircled by 6-8, the last whorl by 18 (more or less) granulose liræ, every alternate rib of the upper surface and two or three of the base roseus, articulated with dots of brilliant rose-red, the ground-color faint pinkish or yellowish. The base is quite convex; the aperture tetragonal, contracted by teeth and the deflection of the superior margin, which is straightened, bearing a strong tooth, below which the outer and basal lips are well rounded, and bear, within, a few plicæ. The columella is short, very deeply entering the profound, narrow umbilicus (much narrower than in *T. clanguloides*); anterior edge of the columella as in *clanguloides*; terminating below in a very large, heavy, trifid quadrangular tooth, much

larger than the corresponding part in *T. clanguloides*; parietal callous slightly wrinkled; umbilicus border with only one or two denticles. Alt. 12–14, diam. 11–12 mill.

Philippinés; Upolu; Ins. Phoenix, Art, New Caledonian Archipelago; Guan, Marianne Archipelago; Viti Is.

Clanculus stigmatarius A. AD., *P. Z. S.*, 1851, p. 161.—FISCHER, *Coq. Viv.*, p. 217, t. 71, f. 4.

A beautiful rose-dotted species, of which many specimens collected by PEASE and by GARRETT are before me.

T. UNEDO A. Adams. Pl. 10, figs. 17, 18.

Shell elate-conic, very solid, narrowly false-umbilicate, red or reddish brown, dotted with black; rosy at apex; outlines of spire a little concave toward the apex; whorls about 7, nearly flat above, sutures linear, impressed, last whorl descending anteriorly, encircled by about 13 or 14 granose liræ every second one, or on some specimens every one articulated with black dots; the interstices finely spirally and obliquely striate; base convex; aperture tetragonal, the outer lip bearing within a strong tubercle above, and a few plicæ on the outer and lower part; columella short, oblique, with a very slight fold above, very deeply entering the profound, extremely narrow axial pit, and at the base terminating in a large squarish trifid tooth; parietal tract finely wrinkled; umbilicus bounded by a plicate rib. Alt. 12–16, diam. 11–15 mill.

Ins. Art, New Caledonian Archipelago (Montrouzier); Viti Is. (Garrett.)

This species differs from *T. stigmatarius* in the same way that that form differs from *T. clanguloides*. It is higher, narrower, more acute than *stigmatarius*; the color is darker; the liræ of the body-whorl less numerous, and the umbilicus narrower. The microscopic spiral lines in the inter-liral interstices also constitute a perfectly tangible and characteristic difference.

T. CEYLANICUS Nevill. Pl. 11, fig. 48.

Shell small, conical, solid, whitish or yellowish, radiately striped above with sepia, alutaceous or reddish brown, the stripes at the periphery frequently branching, and with additional stripes intercalated between them, all of which continue upon the base as narrow rays, or are there broken into tessellations; whorls 5 to 6, slightly convex, spirally granose-lirate, the last bearing 12 or 13 liræ, the upper six larger, separated by obliquely striate interstices about as

wide as the ridges, basal liræ finer, closer, more minutely granose; last whorl bluntly angulate at the periphery, slightly convex beneath, slightly deflected anteriorly; aperture oblique; outer and basal lips curved, with a plicate thickening or rib within, and a small pliciform denticle above; columella very deeply inserted in the narrow, profound umbilicus, its middle portion subdentate, terminating below in a strong tri-plicate tooth; umbilicus with a strongly crenulate marginal rib. Alt. 7, diam. 7 mill.

Ceylon.

Clanculus ceylanicus G. and H. NEVILL, *Journ. Asiatic Soc. Bengal*, xxxviii, 1869, p. 157, t. 17, f. 7.—FISCHER, *Coq. Viv.*, p. 303, t. 96, f. 3.

A small brown-radiate species, somewhat similar to *T. clanguloides* in form. The more characteristic marks, aside from form and coloration, are the narrow, deep umbilicus, with centrally inserted deeply entering columella, the large, trifid basal tooth, and the number of granose spiral ribs, which is fewer than in allied forms.

T. THOMASI CROSSE. Pl. 10, figs. 14, 15.

Shell conic-globose, umbilicate, maculate with white on a ground of reddish carmine; whorls 5, convex, spirally traversed by five very finely granulose liræ, the first two small, third larger, fourth small, fifth larger than the others; suture profoundly impressed, canaliculate, last whorl with 8 liræ on the base encircling the umbilicus; columella unequally bidentate, the basal tooth larger, compressed; lip at base obsoletely denticulate, elsewhere edentulous; aperture oblique, less ringent than most species of *Clanculus*, fauces sulcate, nacreous; umbilicus white, in young shells smooth, in adults obsoletely crenulated. Alt. 6–6½, diam. 6½ mill. (*Fischer.*)

Is. Art, New Caledonia.

Clanculus thomasi CROSSE, *Journ. de Conch.* x, 1862, p. 405, t. 13, f. 4.—*T. thomasi* FISCHER, *Coq. Viv.*, p. 321, t. 101, f. 1.

A variety is olivaceous green, maculate with white, the apex rosy.

It is a small species, with very prominent, compressed basal tooth, and slight crenulations at the margin of the umbilicus, the right lip not dentate.

T. SATRAPIUS von Martens. Pl. 39, figs. 25.

Shell conoidal, umbilicate, granulate-cingulate, cinguli unequally elevated, smaller ones interpolated, numbering 5 to 6 between suture and periphery, 7 to 8 on the base of the last whorl; periphery

obtusely angulated; granules of rosy-red and white subalternating; suture moderate; aperture very oblique, subquadrangular, fauces sulcate, corresponding to the ridges of the exterior; outer margin obtuse, subcrenulate; basal margin plicatulate; columella disjoined and prominently denticulate above, oblique, with 1 or 2 tubercles where it joins the basal margin; umbilicus narrow, margin not crenate, with an elevated fold within, white.

Alt. 14, diam. $14\frac{1}{2}$ mill. (*Martens.*)

Persian Gulf; Aden.

T. satrapius MART., *Vorderas. Conchyl.*, p. 100, t. 6, f. 50.—*T. tonnerrei* NEVILL, *Journ. Asiat. Soc. Beng.*, 1874, p. 27, t. 1, f. 3, and l. c. 1875, p. 103.

T. CORALLINUS Gmelin. Pl. 10, figs. 1, 2.

Shell globose-conic, umbilicate, coral-red or brown, marked beneath the sutures with narrow flames of white and maculations of brown, and on the base dotted with white; spire conic, acute; sutures subcanaliculate; whorls 5 to 6, convex, spirally granose-lirate, the last rounded, encircled by 14 or 15 conspicuously granose equal ridges, the interstices finely obliquely striate, and with more or less obvious spiral striæ; aperture oblique, subtetragonal; outer lip plicate within, dentate above, the tooth usually bifid; basal margin curved, crenulate within; columella inserted deep in the rather narrow umbilicus, bearing a strong dentiform fold above and a large quadrangular biplicate tooth at the base; parietal wall wrinkled; umbilicus white, smooth within, with a crenulate margin.

Alt. 9, diam. 11 mill.

Mediterranean and Adriatic Seas.

Trochus corallinus GMEL., *Syst. Nat.* xiii, p. 3576 (1788), and of most authors.—*Monodonta couturii* PAYRANDEAU, *Cat. desc. et. Méth. des Annelides et des Moll. de l'île de Corse*, p. 134, t. 6, f. 19, 20 (1826).—*Otavia corallina*, RISSO, *Hist. Nat. l'Eur. Mérid.* iv, p. 133.—? *Trochus roseus* VON SALIS, *Reisen ins Königreichs Neapel*, p. 376 (1793).—*Clanculus corallinus*, BUCQUOY, DAUTZENBERG et DOLLFUS, *Moll. Mar. du Roussillon*, p. 409, t. 50, f. 1–4 (1885).—*Trochus multigranatus* PHILIPPI, *Zeitschr. f. Mal.* 1848, p. 147.—*Conchyl. Cáb.*, p. 239, t. 36, f. 6. (Pl. 19, figs. 14, 15.)

A common Mediterranean species exhibiting considerable variation in color. The deep brown form is var. *brunneus* Réquien. (Var. *atra* Monts. is a synonym.) Philippi's *T. multigranatus* was described

from a specimen with 16 series of granules upon the body-whorl. The species is somewhat allied to *T. ceylanicus*, but is larger, less conical, and has a different color-pattern. The large basal tooth will separate it from other Mediterranean forms. I have not thought it necessary to quote in the synonymy every author who has written on this well-known species.

T. ERUBESCENS Philippi. Pl. 42, figs. 12, 13.

Shell conoidal, white, radiate with red; whorls slightly convex, deeply separated by the suture, granulate, granules of the penultimate whorl in 5 to 6 series, 7 on the last, 12 to 14 on the base; false-umbilicus with a denticulate margin; aperture subrhomboidal; columella straight, denticulate above, subsolute, the margin crenulated. (*Philippi*.)

The shell is conoidal, somewhat broader than high, granulate. The whorls are but slightly convex, but separated by a deep suture, the lower ones with 5-6 rows of granules, of which the three upper are crowded, the two lower wider apart. In the interstices there are two elevated lines, which also become rows of granules at last. The false-umbilicus is denticulate on its margin. The almost vertical columella has a tooth above, and three denticles on the edge. The outer lip is plicate within, but less obviously to the touch than to the sight. The color is whitish with pale red flames. From *T. kraussi* this species is distinguished by the more depressed shell, less convex whorls, paler color and much more numerous series of granules of the base. Alt. 11, diam. 14 mill. (*Philippi*.)

Habitat unknown.

T. erubescens PHILIPPI, *Conchyl. Cab.*, p. 101, t. 16, f. 13.

Seems to be a variety of *T. kraussi*.

T. BERTHELOTI d'Orbigny. Pl. 11, figs. 46, 47.

Shell small, globose-conic, very similar in form to *T. corallinus*; whorls 5, acutely granose-lirate, brown, below the sutures more or less maculated with blackish, base dotted with white; last whorl encircled by 11 sharply granose ridges, those of the base profoundly separated by deep grooves, wider than the ridges; aperture as in *T. corallinus*, but the tooth at base of columella more pointed, smaller.

Alt. 6-8, diam. $8\frac{1}{2}$ -9 mill.

Madeira, Azores and Canary Is.

Monodonta bertheloti D'ORB., in Webb et Berthelot, *Hist. Nat. des Canaries*, p. 81, t. 6, f. 17-20.—*Trochus bertheloti* PHILIPPI, *Conchyl. Cab.*, t. 39, f. 17.—FISCHER, *Coq. Viv.*, p. 295, t. 95, f. 1.

Allied to *T. corallinus*, but easily distinguished by the deeply separated liræ of the base.

T. CRUCIATUS Linné. Pl. 11, figs. 60, 61; pl. 19, figs. 16, 17.

Shell globose-conic, narrowly umbilicate, spire conic, apex acute, pinkish; dark brown, blackish or pink, radiately maculated with white below the sutures, and dotted with white around the center of the base; whorls 5 to 6, convex separated by canaliculate sutures, spirally granose-lirate; body-whorl rounded, encircled by about 13 liræ, those above the periphery granulose, about as wide as the interstices, those beneath more separated, smoother; interstices finely spirally striate; base convex; aperture subcircular, oblique; outer and basal lips rounded, finely crenulate within; columella slightly concave, bearing a small denticle at base and above near the insertion; parietal wall nearly smooth; umbilicus deep, narrow, smooth, and white within, bordered by a strong smooth or obsoletely crenulated marginal rib, and surrounded by narrow tract of white.

Alt. 8-9, diam. 9-10 mill.

Mediterranean Sea; Cape Verde Is. (Rochebrune.)

T. cruciatus, LINN., *Syst. Nat.* xii, p. 1228. (1767).—HANLEY, *Ipsa Linn. Conch.*, p. 315, t. 5, f. 6.—FISCHER, *Coq. Viv.*, p. 298, t. 95, f. 3.—*Monodonta vieillotii* PAYRANDEAU, *Cat. des Annelides et des Moll. Corse*, p. 135, t. 6, f. 21-23 (1826).—*T. vieiloti* PHILIPPI, *Conchyl. Cab.*, p. 80, t. 14, f. 13, and of other authors.—*T. mediterraneus* WOOD, *Ind. Test. Suppl.*, t. 5, f. 32.—*Clanculus cruciatus* BUCQUOY, DAUTZ. ET DOLLFUS, *Moll. mar. du Roussillon*, p. 411, t. 50, f. 5-12.

A species of about the size of *T. corallinus*. The obsolescence of the teeth will distinguish this form from any other Mediterranean *Clanculus*. The subgenus *Clanculopsis* of Monterosato is based upon this character; but in view of the great variation observed in the teeth of nearly related species, and of the fact that this shell is really very closely allied to *T. corallinus* I am not inclined to give any systematic value to the division.

Var. *GLOBOSO-CONICA* Arad. et Ben. (*Conch. viv. mar. della Sicilia*, p. 171.)

Whorls with a broad subsutural margin lacking liræ; last whorl with four, penultimate and antepenultimate with three granose liræ. A form said by Aradas and Benoit to be constant, though rare. I have not seen examples.

The following variations have received names. They are scarcely distinct enough to be called varieties, for typical examples of all three occur in one of the sets before me.

Var. *nigrescens* Réquien. (-brunnea Réq.,-monochroa Monts.) Color uniform brown or blackish, without white flammules.

Var. *rosea* Monts. (pl. 19, fig. 13.) Rose-colored, with or without white markings.

Var. *candida* Monts. (pl. 19, fig. 12.) Entirely white. This and var. *rosea* are abundant in the Gulf of Gabes, Tunis. (See *Moll du Roussillon*, p. 413.)

T. KRAUSSI Philippi. Pl. 10, figs. 8, 9.

Shell umbilicate, conoid, moderately thick; whorls 5, convex, separated by canaliculate sutures; first whorls eroded, whitish, the rest roseus, cinereous or brownish, ornamented with a few radiating white streaks, spirally granose-lirate, the lirate 6 on the penultimate whorl, the fifth larger, more prominent, simulating a carina; last whorl angulate, plano-convex beneath, concentrically cingulate, the cinguli granose, about 7, the interstices sometimes bearing concentric liræ; aperture rhomboidal, lip within thickened, sulcate, basal margin crenulate; columella tuberculose, above twisted plicate, below obsoletely truncate; umbilical area white spirally plicate, margin crenulate; parietal callous thin, wrinkled.

Alt. 19, diam. 12 mill. (Fischer.)

W. Coast of Africa.

Monodonta kraussi PHILIPPI, *Zeitschr. f. Mal.* 1846, p. 100.—*T. kraussi* PHIL. *Conchyl. Cub.*, p. 82, t. 14, f. 14.—FISCHER, *Coq. Viv.*, p. 377, t. 114, f. 4.

Allied according to Dr. Fischer, to *T. cruciatus* L. but distinguished by the less rounded whorls, shallower sutures, closer spiral liræ, smaller tooth at base of columella and by the well developed umbilical crenulations.

T. JUSSIEUI Payrandeau. Pl. 11, figs. 36–38; pl. 19, fig. 11.

Shell depressed-globose conic, umbilicate, polished, shining, blackish, olive or purplish brown, unicolored, dotted or tessellated with white, often with short flames of white beneath the sutures and always more or less marked with white around the umbilicus; spire conical, sutures simple, impressed; whorls 5 to 6, convex, the upper surface marked with obsolete, frequently almost imperceptible liræ, the interstices between them finely spirally striate; base smoother,

lightly concentrically marked around the center; aperture rounded, outer and basal margins crenulated within; columella bearing a small tooth above and below, concave between them, deeply entering the umbilicus, but inserted on its edge; umbilicus rather deep, smooth within, bordered by an irregularly crenulated rib.

Alt. 11, diam. 14 mill; alt. $8\frac{1}{2}$ diam. 9 mill.

Mediterranean and Adriatic Seas.

Monodonta jussiei PAYR. *Cat. Annelides et Moll. Corse*, p. 136, t. 6, f. 24, 25 (1826).—*M. jussieui* PHILIPPI, *Enum. Moll. Sicil.* ii, p. 157 (1844).—*Trochus jussieui* PHIL., *Conchyl. Cab.*, p. 81, t. 14, f. 11.—FISCHER, *Cog. viv.*, p. 238, t. 82, f. 1.—*Clanculus jussieui* BUCQ., DAUTZ. ET DOLLF., *Moll. Mar. du Rouss.*, t. 50, f. 13–20, p. 413.—*Clanculus blainvillei* CANTRAINE, *Malac. Medit. et litt.* t. 6, f. 14, 14a; *Bull. Acad. Brux.*, ix, p. 344.—*Trochus glomus* PHILIPPI, *Enum. Moll. Sicil.*, ii, p. 157, t. 25, f. 16; *Conchyl. Cab.* p. 82, t. 14, f. 15.

To be consistent, Payrandeau's original spelling of this name ought to be revived; but since the emended form used by Philippi has been adopted by all modern authors we would perhaps in this case lose rather than gain by a rigid adherence to principle. The species was named in honor of M. ADRIEN DE JUSSIEU, "professeur au Jardin du Roi."

It is a variable form in size, coloration and sculpture; the surface is remarkably smooth and shining for a *Clanculus*. The following color varieties are described by Messrs Bucquoy, Dautzenberg and Dollfus. (*Moll. du Roussillon*, p. 415.)

Var. *GLOMUS* Phil. (pl. 19, figs. 9, 10). More decidedly lirate above than the type. This is a transition form to *T. cruciatus*.

Var. *STRIATA* Monts. Small, polished, under a lens showing fine spiral lines. (*Gulf of Gabés, Tunis.*) Var. *BLAINVILLEI* (pl. 11, fig. 36). Conspicuously tessellated. Var. *ROSEO-CARNEA* Monts. Roseate or violaceous in color.

T. SPADICEUS Philippi. Pl. 9, figs. 97, 98; pl. 11, figs. 52, 53.

Shell umbilicate, conoid, thick, shining; whorls $5\frac{1}{2}$, convex, the first vivid rose-color, following chestnut-brown, subcanaliculate at the suture, in the middle subangulate, minutely spirally cingulate, the ridges about 9 on the penultimate whorl; last whorl carinated, slightly convex beneath and paler, white and brown maculate, concentrically marked with about 9 delicate liræ, the interstices radiately striate; aperture subtrapezoidal, plicate within; lip double,

basal margin denticulate; columella oblique, granulose without, above contorted, truncated below; umbilical area white, with an interior spiral ridge, crenulated at margin; columellar callous obsolete. Alt. 10, diam. 14 mill. (*Fischer*.)

W. Coast Equatorial Africa; Annabon Id.

T. spadiceus PHIL, *Zeitschr. f. Mal.* 1848, p. 125.—*Conchyl. Cab.*, p. 239, t. 36, f. 7.—DUNKER, *Ind. Moll. Guin. infer. coll.* p. 17, t. 2, f. 43–45.—FISCHER, *Coq. Viv.*, p. 390, t. 117, f. 1.—*T. ludwigi* KRAUSS, *Die Südaf. Moll.* p. 99, t. 5, f. 33 (1848).—PHILIPPI *Conchyl. Cab.*, p. 323, t. 46, f. 5.

Allied to the preceding by the comparatively smooth shell.

T. ludwigi Krauss (pl. 13, figs. 93, 94) seems to be an immature form of *spadiceus*, and if so probably has priority; for the preface of *Die Südaf. Moll.* is dated *January*, 1848. The diagnosis of Krauss is as follows:

Shell obliquely conoidal, apex acute, umbilicate, roseate, sculptured with irregular delicate transverse striæ, which are subgranulose below the suture; whorls 6, convex; separated by subcanaliculate sutures, the last subangulate; base convex, striate, with two white-spotted cinguli around the umbilicus; umbilicus white, bounded by a prominent margin; columella oblique, solute above, unidentate, base (4 or 5) denticulate; aperture rounded-rhomboidal; lip acute, callous and denticulate within. Alt. 2, 4, diam. 3 lines. (*Krauss*.)

Cape of Good Hope.

T. ATROPURPUREUS Gould. Pl. 15, figs. 50, 51; pl. 11, figs. 28–32; pl. 13, figs. 86–87.

Shell depressed, conoid, umbilicate, dark purplish or ferruginous brown, unicolored, the apex carmine; whorls 6, convex, granose-lirate, the sutures narrowly subcanaliculate, last whorl rounded at the periphery, abruptly briefly deflected anteriorly, encircled by 16 or 17 finely, very regularly but feebly granose liræ, which are wider on the base; aperture rounded, outer and basal lips regularly curved thickened and finely crenulated within; columella deeply entering the profound umbilicus, bearing a minute denticle above and at the base; umbilicus profound, smooth within, bordered and constricted by a marginal rib bearing about four white teeth, the largest near to the parietal wall of the aperture. Alt. 7, diam. 9 mill.

Samoa and Viti Is.; Sorong, New Guinea; San Christoval, Solomon Is.; Tutuila, Navigators' Is.

Trochus (Monodonta) atropurpureus GLD., *Proc. Bost. Soc. Nat. Hist.* iii, p. 107 (1849).—*U. S. Expl. Exped. Shells*, p. 189, t. 13, f. 224.—*Trochus samoensis* HOMERON ET JACQUINOT, *Voy. au Pole Sud.* etc., Zool., v. p. 58, t. 14, f. 21–25 (1854).—FISCHER, *Coq. Viv.*, p. 239, t. 82, f. 2.

A solid little species, evidently allied to the group of *T. cruciatus* ("Clanculopsis"). Numerous specimens before me show little variation. The more notable characters are the uniform dark color with rosy apex, the very regular and superficial cutting of the liræ into beads on every part of the surface, and the teeth around the umbilicus.

T. BATHYRHAPHE E. A. Smith. Pl. 11, figs. 34, 35.

Shell depressed-conic, the base flattened, olive-green, the apex green, ornamented with deep brown granules, rather widely umbilicate; whorls $5\frac{1}{2}$, convex, separated by a narrowly canaliculate suture, encircled by granose liræ, about 7 on penultimate whorl; last whorl with roundly angulated periphery, encircled by about 14 granulose liræ, umbilicus white, surrounded by a white granuliferous rib, and with a smooth rib within; aperture oblique, beautifully pearly, lirate within, lip with the outer margin crenulated, at the base strongly lirate; columella inserted on the whorl above, oblique, dentate below. Alt. $6\frac{1}{2}$, diam. $8\frac{1}{2}$ mill. (*Smith.*)

San Christoval, Solomon Is.

Trochus (Clanculus) bathyrhappe SMITH, *Journ. Linn. Soc. London*, xii, p. 557, t. 30, f. 17 (1876).

Distinguished from *atropurpureus* by the difference of color, more rounded spire, and the peculiarity of the umbilicus. The main color of *bathyrhappe* is a very dark olive-green, the apex being bright green; the granules of the infrasutural series, which are considerable larger than the rest, are dark brown at intervals, two or three together being of this color, and those between them of the same hue as the shell. The granules on the base are subalternately reddish-brown and greenish. (*Smith.*)

T. MICRODON A. Adams. Pl. 13, figs. 91, 92.

Shell depressed conoidal, thick, solid, of a reddish-brown hue, interstices between the ribs, chocolate colored, above marked with a few broad yellowish or flesh-tinted maculations radiating from the sutures toward, but not quite reaching the periphery, which with the base, has the ribs sparsely dotted with white; spire low-conic, apex

roseate; suture distinct, not canaliculate; whorls 5, moderately convex, encircled by liræ more or less distinctly granulate, very unequal in size, numbering, on the last whorl about 14, the interstices closely obliquely striate, and usually bearing a minute central riblet; body-whorl descending anteriorly, rounded at the periphery; base convex, the revolving liræ more superficially and much more closely cut into granules than those of the upper surface, and also broader, flatter, and equal in size, numbering 6 to 7, one or two around the umbilicus white, dotted with yellow or reddish, the remainder reddish-brown, sparsely articulated on the ribs with white, sometimes radiately marked with narrow white stripes; aperture oblique, somewhat contracted, subcircular; outer and basal lips thickened, finely crenulated within; columella oblique, with a tooth-like fold above, solute, and deeply inserted upon the side of the umbilicus, middle portion concave, with a reflexed subdenticulate edge, ending beneath in a minute denticle; umbilicus profound, smooth and polished within, bordered by a strong rib bearing 6 or 7 projecting white teeth, the upper one the largest.

Alt. 9, diam. 12 mill.

Andaman Is.

Clanculus microdon A. AD., *P. Z. S.* 1851, p. 162.—E. A. SMITH, *P. Z. S.* 1878, p. 818, t. 50, f. 21.

A species belonging to the group of *atropurpureus*, *bathyrhaphæ*, etc., including species in which the base of the columella is scarcely toothed, but passes into the basal margin in a regular curve, bearing several subequal denticles, the columella above inserted upon the side of the umbilicus instead of in the center of the axis as in the typical *Clanculopsis*. From *T. atropurpureus*, which seems to be its nearest ally, *T. microdon* differs in the larger size, variegated coloration, and irregularity of the spiral ribs on the upper surface.

T. PLEBEIUS Philippi. Pl. 10, figs. 19–22; pl. 13, figs. 1, 2.

Shell small, depressed, umbilicate, pinkish brown, gray or yellow, the ribs articulated with dots of black and white, often forming radiating lines above, zigzag beneath, where yellow replaces pink in the ground-color; spire low-conic, apex acute; whorls about 5, coarsely lirate, the sutures subcanaliculate; body-whorl obtusely angular at the periphery, its upper surface encircled by 4 coarse, somewhat beaded liræ, the upper two contiguous, the third separated by wide intervals above and below it, the fourth peripheral, usually

formed of two ridges close together, the interstices bearing numerous fine spiral striae and sharp microscopic incremental striae; base convex, concentrically sculptured with numerous (6 to 9) smooth striae, in the intervals between which very numerous microscopic striulae revolve; aperture rounded, oblique, outer and basal margins thickened and very minutely crenulated within; columella oblique not tortuous above, nor entering the umbilicus, but inserted upon its side; front edge nearly straight, denticulate at the base; umbilicus wide, not very deep, its margin somewhat denticulate.

Alt. 7, diam. 10 mill.

S. Australia; Tasmania.

T. plebejus PHIL. *Zeitschr. f. Mal.* 1851, p. 41, and *Conchyl. Cab.* p. 326, t. 46, f. 10.—FISCHER, *Coq. Viv.*, p. 243, t. 83, f. 2, 2a.—*Clanculus nodiliratus* A. ADAMS, *P. Z. S.* 1851, p. 163.—*C. nodoliratus* TENISON-WOODS, *Proc. Roy. Soc. Tasmania*, 1877, p. 40.

Both Adams and Philippi proposed names for this form in 1851. I give precedence to that of the latter author because the description is better, and is accompanied by excellent figures. The species when typically developed is easily recognized by the very coarse sculpture of the upper surface, and the minute concentric striation of the base and interstices. To this (typical) form Dr. Fischer gave the mss. name *T. muscarius*, which he considers a var. β . of *plebejus*. There are also smoother forms exhibiting numerous lirae above, which, while still unequal in size, are not nearly so prominent as in the types. These specimens (pl. 13, figs. 77, 78) have a rounded periphery, and only the upper few lirae are granulose. In the Academy collection they are marked *C. rubicundus* Mighels; but I have seen no description of such a species by that author. The ground color is yellowish, obliquely, narrowly radiate above and below with blackish lines, edged anteriorly with white, the lines of base and top uniting in a V-shaped angle on the periphery, when the pattern is, not too much interrupted.

T. BICARINATUS Angas. Pl. 11, figs. 33.

Shell umbilicated, turbinate, solid, very dark purplish-brown; whorls 6, prominently keeled in the center, the last whorl with two keels, one above and one below the periphery, sculptured all over with distinct separated rows of regular, close-set bead-like nodules, those on the keels being double the size of those between them, the interstices crossed with fine oblique striae; outer lip strongly dentate

within, and surrounded by a row of black spots at the margin; columella nearly straight, with a small tooth-like projection at either end, the margin of the false-umbilicus dentate, with an incurved tooth above, and crenate at the base, around the umbilical margin white; interior pearly white. Alt. 12, diam. 16 mill. (*Angas.*)

Port Darwin, N. Australia.

C. bicarinatus ANGAS, *P. Z. S.* 1880, p. 419, t. 40, f. 4.

This shell is remarkable from its having too strong keels on the last whorl, and also on account of its uniform dark brown color. (*Angas.*)

T. GRANOSUS Brazier.

Shell conoid, spire prominent, apex white, smooth; whorls $4\frac{1}{2}$, flattened, spirally encircled with four rows of beaded grains, the two upper near the suture being the smallest, interstices with very minute oblique striae, ornamented with white and light brown flames; suture deep, last whorl large and inflated, having five beaded rows of grains, the last being contiguous to the suture; base slightly convex, finely grained; aperture oblique, triangularly ovate; peristome denticulated; columella white; umbilicus marginal plicated and denticulated below.

Alt. 6, diam. maj. $5\frac{1}{2}$, min. $4\frac{1}{2}$ mill. (*Brazier.*)

Barnard Is., No. III, N.-E. Australia.

Clanculus granosus BRAZIER, *Proc. Linn. Soc. N. S. Wales*, ii, p. 43 (1878).

Found in crevices of large blocks of coral. I cannot determine the specific relationships of this unfigured *Clanculus*, as the description gives no details of the structure of the columella.

T. RINGENS Menke. Pl. 11, figs. 49, 50.

Shell perforate, conical; whorls 7, the first smooth, yellowish, following planulate, separated by canaliculate sutures, maculate with chestnut and white, spirally cingulate above with 4 elegantly granulate ridges, the upper and lower the larger, last whorl acutely carinated; base slightly convex, ornamented with 8 to 9 granose cinguli; aperture rhomboidal, oblique, narrow; basal margin sulcate-denticulate; columella strong, oblique, terminating below in a large tooth, ringent above; columella callous, ringent, plicate.

Alt. 10, diam. 11 mill. (*Fischer.*)

S. Australia, Port. Lincoln; Van Diemen's Land.

Monodonta ringens MENKE, *Spec. Moll. Nov. Holl.* p. 14, no. 53 (not *M. ringens* PHIL. 1846).—*T. ringens* PHILIPPI, *Conchyl. Cab.*, p. 235, t. 36. f. 1.—FISCHER, *Coq. Viv.*, p. 213, t. 71, f. 1.

May be known by the conical form, not depressed nor gibbous like the majority of *Clanculus*. It is sometimes quite narrow, the altitude greater than the diameter.

T. LACEYI Sowerby Jr. Pl. 18, fig. 21.

Shell conical, grayish-brown, all over covered with series of minute granules; whorls 6, conspicuously bi-angulate; last whorl slightly convex beneath; umbilicus white, deeply excavated; aperture oblique, fauces iridescent, obsoletely sulcate; columella obscurely folded above, conspicuously uniplicate at base.

Alt. 14, diam. 13 mill. (*Sowerby*.)

Port Elizabeth, S. Africa.

Clanculus laceyi SOWB., *Journ of Conchol.* (Leeds) vi, 1889, p. 11, t. 1, f. 16.

An interesting bi-angulated species, more conical than *C. carinatus*. (*Sowb.*)

Unfigured, imperfectly known and insufficiently described species of Clanculus.

The following species are known to me only by the descriptions, which are reprinted in full below. A few have been recognized by Australian naturalists, and in these cases I have given such additional information as is accessible to me. Most of those descriptions by A. Adams, without either locality or measurements are mere trash. Such careless work does not deserve recognition.

The arrangement is alphabetical; but the original sequence of the descriptions may be determined by the species number.

CLANCULUS ACUMINATUS A. Adams. C. testa elevato-conica; spira acuminata, fusca, nigro-fusca punctata, cingulis transversis subdistantibus granorum ornata; interstitiis lineis transversis et longitudinalibus decussatis; margine umbilici subnodulosa; columella margine reflexo, integro, basi dente simplici magno terminata; labro intus lirato.

Sibonga, island of Zebu, under stones. (Cuming.)

Proc. Zool. Soc. Lond. 1851, p. 160, no. 31.

CLANCULUS ALBINUS A. Adams. C. testa conoidea, albida, cingulis granorum confertis ornata, granis nonnullis fusca-punctatis;

anfr. convexus, ultimo rotundato; margine umbilici plicato-dentato; columella callosa, plicis duabus transversis, basi dente triplicato terminata; labro superne inflexo, intus lirato; tuberculo magno trisulcato prope marginem superiorem.

Habitat unknown.

L. c. p. 160, no. 32.

CLANCULUS BRUNNEUS A. Adams. C. testa depresso-conica, fusca, cingulis granorum subdistantibus ornata; interstitiis longitudinaliter elevata striatis; anfr. planiusculis, ultimo acute angulato, umbilici margine plana; columella transversim plicata, margine fimbriata, basi dente bi-plicato terminata; labro intus lirato, lira suprema majore.

Habitat unknown.

L. c. p. 161, no. 37.

CLANCULUS CINGULIFER A. Adams. C. testa elevato-conoidea, carneola, cingulo albo rufoque articulado ornata; anfr. rotundatis, cingulis transversis granosis sculptis; basi concava, peromphalo albo rosea radiato, margine plicato; columella crassa, supra nodosa, infra uniplicata; basi dente triplicato terminata; labro intus lirato; tuberculo maximo prope margine superiorem.

Habitat unknown.

L. c. p. 160, no. 28.

CLANCULUS CONSPERSUS A. Adams. C. testa orbiculato-conica, rufescente, albo rubroque variegata, cingulis moniliformibus transversis ornata, cingulo infra suturam majore, anfractu ultimo angulato; columella antice plica magna transversa terminata, postice subcanaliculata vix tortuosa; labro intus valde dentato-lirato.

Habitat unknown.

L. c. p. 163, no. 46.—TENISON-WOODS, *Proc. Roy. Soc. Tasmania*, 1877, p. 40.

Tenison-Woods says of this species: A trochiform coarsely granular shell, with last whorl subangular, variegated red and white; toothed on the inner lip. Alt. 11, diam. 13 mill. whorls $4\frac{1}{2}$.

N.-E. Tasmania; Bass' Sts.

CLANCULUS DEPICTUS A. Adams. C. testa conoidea, pseudo-umbilicata, albida, viridi fuscoque radiatim picta, cingulis subgranosis inæqualibus ornata; anfr. planis, ultimo ad peripheriam angulato; margine umbilici simplice; columella superne uniplicata,

inferne tuberculis tribus parvis instructa; intus lirato, margine lævi.

Bombay (Cuming.)

A prettily variegated conical species, somewhat resembling a *Polydonta* in appearance. (*A. Ad.*)

P. Z. S. 1854, p. 316.

CLANCULUS EDENTULUS A. Adams. C. testa orbiculato-conoidea, sordido rufa, albo variegata, cingulis transversis granosis sculpta; anfr. parum convexus, umbilici margine suberenulata; columella supra plicata, infra edentula, margine infra tuberculis tribus; labro intus subsulcato.

Habitat unknown.

P. Z. S. 1851, p. 162, no. 40.

CLANCULUS JUCUNDUS Gould. Testa parvula, depressa, ovato-conica ochracea vel rufescens; anfr. 5, convexus, prope suturam tessellatis, interdum omnino strigatis, liris inæqualibus cinctis, ad anfr. majores gemmatis; sutura canaliculata; basi rotundato; umbilico crenulato; dente columellari eminente, acuto; labro intus sulcato. Alt. 5, diam. 5 mill.

Sydney, N. S. W.

About the size of *C. minor*.

Proc. Bost. Soc. Nat. Hist. viii, p. 17 (March, 1861).—*Otia Conch.*, p. 156.

CLANCULUS MACULOSUS A. Adams. C. testa elevato-conoidea, rufo-fusca, maculis albidis variegata; anfr. rotundatis, cingulis granorum ornatis, interstitiis oblique striatis, margine umbilici crenulato; columella supra tuberculo magno instructa, basi dente biplicato terminata; labro intus lirato, lira suprema maxima.

Habitat unknown.

P. Z. S., 1851, p. 160, no. 29.

CLANCULUS MINOR A. Adams. C. testa parva, conica, albida, fasciis rufo-fuscis radiatim ornata; anfr. planis, cingulus transversis granosis sculpta, anfractu ultimo angulato, basi planiuscula, margine umbilici crenulata; columella tuberculo decurvato terminata; labro intus lirato.

Id. of Masbate, sandy mud, 7 fms. (Cuming.)

L. c. p. 161, no. 36.

CLANCULUS NIGRICANS A. Adams. C. testa depresso-conica, umbilicate, nigricante; anfr. planis, cingulis quinque granulatis ornata, ultimo angulata, carinis planis duabus in parte inferiore,

cingulis 5-6 articulatis sulcisque intermediis sculpta; umbilici margine crenulato; columella recta, superne soluta, in parte superiore tuberculata, extus tuberculis tribus instructa; labro intus levi.

Habitat unknown.

L. c. p. 162, no. 41.

CLANCULUS ORMOPHORUS A. Adams. C. testa depresso-conica, umbilicata, anfr. rotundatis, cingulis granorum æqualibus ornatis, cingulo primo, secundo et tertio granis fuscis albis alternantibus, quarto granis fuscis ornato; anfractu penultimo gibboso, ultimo rotundato; umbilico crenulato; columella callosa, subreflexa, basi dente triplicato.

Habitat unknown.

L. c. p. 159, no. 26.

TROCHUS PLANOSPIRUS Kiener.

This species is known only by two illustrations in Kiener's *Spec. et iconogr., genus Trochus*, pl. 56, fig. 3 (copied on my pl. 11, figs. 41, 42). One of these figures is probably *C. floridus* Phil.; the other is a different species, but it is practically unidentifiable because of the total lack of knowledge we have of the aperture.

CLANCULUS SULCARIUS A. Adams. C. testa parva, albida, fasciis fuscis radiatim ornata, cingulis distantioribus granorum instructa, interstitiis longitudinaliter oblique striatis; anfr. parum convexus; margine umbilici crenulato; columella dente pliciformi; labro intus crenulato.

Id. of Masbate, sandy mud, 7 fms. (Cuming.)

P. Z. S., 1851, p. 160, no. 30.

CLANCULUS TEXTILOSUS A. Adams. C. testa conoidea, spira acuminata, cingulis granorum inæqualibus ornata, primo, tertio et sexto coccinea, secundo, quarto, quinto et septimo granis albis nigris alternantibus ornata; margine umbilici dentato; columella biplicata, margine acuta, basi dente triplicato terminata; labro intus lirato, prope marginem superiorem tuberculo magno.

Id. of Ticao, sandy mud, 6 fms. (Cuming.)

L. c. p. 161, no. 35.

CLANCULUS TURBINOIDES A. Adams. C. testa turbinato-conoidea, fusca, cingulis subdistantibus granorum ornata; interstitiis lineis transversis prominulis; anfractibus rotundatis, sutura canaliculata, basi cingulis concentricis granorum instructa; umbilico dentato; columella sulcata, margine reflexa, tuberculis quatuor; labro intus lirato.

Habitat unknown.

L. c. p. 160, no. 33.

CLANCULUS ZEBRIDES A. Adams. C. testa conoidea, fuscesceni, nigro-fusco radiatim picta, oingulis granorum sculpta; intersitiis lineolis transversis elevatis; anfr. rotundatis; umbilici margine crenulata; columella supra tuberculo, margine callosa, basi tuberculo magno terminata; labro intus dentibus linearibus instructo.

Habitat unknown.

L. c. p. 161, no. 39.

Said by Tenison-Woods to be the same as *C. variegatus* A. Ad.

Genus MONODONTA Lamarek, 1801.

Monodonta LAM. Syst. des. An. s. Vert. p. 87 (1801).—GRAY, Syst. Dist. Moll. Brit. Mus., p. 155.—A. AD. *P. Z. S.* 1851, p. 173.—H. and A. AD., Gen. Rec. Moll. i, p. 417.—WOODWARD, Manual of Moll. p. 144.—FISCHER, Man. de Conchyl., p. 820.—*Labio* OKEN, Lehrbuch, p. 263, and some other authors.—*Monodontes* MONTF. Conch. Syst. ii, p. 195.—*Trochidon* SWAINS. Treatise on Malacol. p. 351.—*Odontis* SOWERBY, Cat. Tankerv. coll. p. 53.—*Trochulus* HUMPH.—*Monodon* SCHWEIGER.

The genus *Monodonta* was first separated from the Linnæan genus *Trochus* by Lamarek in 1801, *T. labio* L. being given as the type. Later, Lamarek included many species of such dissimilar groups as *Tectarius*, etc; but modern authors have restricted the genus to the toothed Trochids allied to the type.

Monodonta consists of globose-conoidal shells with more rounded body-whorl and aperture than *Trochus*. With the exception of several forms from the West Coast of S. America, the species are all Old World in distribution, mostly tropical. All are littoral. Geologically, the genus dates from the Trias. The prominent character of the dentition (pl. 50, figs. 5, 12) is the development of the lateral basal angles of the central and lateral teeth into broadly projecting lobes imbricating over the adjacent tooth; the cusp of the central is wide, shortly reflexed, its edge denticulate at the sides, smooth in the middle.

Subgenus MONODONTA Lam.

Section *Monodonta* (restricted).

M. LABIO Linné. Pl. 19, figs. 95, 96.

Shell imperforate globose-turbinate, very solid, grayish-pink or greenish, mottled or longitudinally striped with purplish-red or

blackish; spire conic, acute; whorls 6-7, slightly convex, spirally sculptured with coarse, irregular, coarsely granose liræ, about 6 in number on the penultimate whorl; sutures not much impressed, the whorl flattened just below it; last whorl globose, rounded; base rounded; aperture oblique lined with a white porcellaneous layer, rounded, the outer and basal lips margined with green, beveled to an edge, plicate within; columella short, projecting and terminating as a square tooth-like prominence into the aperture below, forming a square notch between it and the oblique plications of the base; parietal wall not calloused above. Alt. 35-40, diam. 28-34 mill.

Indian Ocean; E. African Coasts; E. Indies; Japanese and Chinese Seas.

• An abundant and mutable species, very variable in the comparative length of the spire, and in coloration.

Trochus labio LINN, Syst. Nat. x, p. 759 (1758).—*Monodonta labio* LAMARCK, Encyc. Méth., p. 447, f. 1, 2 and of other authors.—*Trochus labio* PHILIPPI, Conchyl. Cab., p. 166, t. 27, f. 1-4, t. 44, f. 8.—FISCHER, Coq. Viv., p. 223, t. 73, f. 1, t. 74, f. 4.—*Monodonta confusa*, TAPPARONE-CANEFRI, Zool. Viaggio della Magenta, Malac., p. 61, t. 1, f. 8 (1874).

Troschel's figure of the dentition of this species is given on Pl. 50, fig. 5.

Var. CONFUSA Tapparone-Canefri. Pl. 22, fig. 37.

This form, of which typical examples are before me, is shaped like *M. labio*; the color is pink, longitudinally clouded with dusky; the penultimate whorl bears 5 or 6, the last 13 or 14 spiral ridges; the second one from the suture is very narrow; the others are subequal, but become smaller beneath; there are no lirulæ intercalated between the ridges on the last whorl, as is usually the case in *M. labio*; and the ridges are very conspicuously and regularly cut into oblong subquadrangular or lozenge-shaped grains by vertical impressions as deep as the inter-liral grooves; the basal tooth of the columella is smaller and more acute than in typical *M. labio*.

Alt. 16, diam. 15; alt. 20, diam. 18 mill.

Singapore.

Var. *minor*, or *immanis* of Fischer (1880) seems to be identical with *confusa*.

Tapparone-Canefri's figure, copied on my plate, does not distinctly enough show the coarsely granose character of the liræ.

The figure 88 of plate 62 represents, according to Philippi an aberrant form of *M. labio*.

M. AUSTRALIS Lamarek. Pl. 62, figs. 84, 85.

Shell similar to *M. labio*, but with rounder whorls, more marked sutures, the liræ lower, *not granulose*, tessellated with black and grayish or greenish; penultimate whorl subangulate by the prominence of its central rib; columella much less strongly dentate than *M. labio*, and the notch or canal below it shallow; basal plicæ less developed than in *M. labio*. Alt. 25, diam. 22 mill.

Seychelles; Madagascar; Cape of Good Hope.

M. australis LAM., *An. sans Vert.* vii, p. 35, no. 11 (1822).—*M. viridis* LAM., *loc. cit.* no. 13.—*Trochus australis* PHILIPPI, *Conchyl. Cab.*, p. 169, t. 27, f. 4, 5.—FISCHER, *Cog. Viv.*, p. 227, t. 74, f. 1, 2 (not of Quoy et Gaimard).—*T. melanochlorus* PHIL., *Conchyl. Cab.*, p. 220, t. 33, f. 2.

Var. *VIRIDIS* Lamarek.

Shell dark green, unicolored or nearly so. This is the *T. melanochlorus* of Philippi.

M. CANALIFERUS Lamarek. Pl. 62, figs. 86, 87.

Shell similar to the preceding, but with more convex, rounded whorls, upon the last of which the spiral liræ become more or less obsolete; the liræ are more distinct upon the upper whorls, and are smooth, with narrow interstices; the color is reddish, purplish or green, the liræ usually articulated with white, but sometimes unicolored; the outer lip is more curved and more finely crenulate within than that of *M. labio*; the columella is short, squarely dentate at base, *its edge more or less rugose, and separated from the columellar area by a deep narrow straight sulcus*, extending from the place of the umbilicus to the notch at base of columella; basal notch deep, divided by a small denticle in the middle.

Alt. 21–24, diam. 18–20 mill.

New Caledonia; Manilla; New Ireland.

Monodonta canalifera LAM., *An. sans Vert.* vii, p. 55, no. 12 (1822).—*Trochus canaliferus* PHILIPPI, *Conchyl. Cab.*, p. 170, t. 27, f. 9, 10.—QUOY ET GAIM. *Voy. de l'Astrol.* t. 64, f. 26–29.—FISCHER, *Cog. Viv.*, p. 225, t. 73, f. 2, et var. *atramentaria* FISCHER, t. 73, f. 3.—*T. parvus* TROSCHEL (in Mus. Berol.) PHILIPPI, *Conchyl. Cab.*, p. 175, t. 27, f. 15.

M. labio has a somewhat similar sulcus parallel to the columella, but is very distinct in sculpture; *M. australis* lacks the median tooth of the basal notch or canal and the sulcus upon the face of the col-

umella is much more superficial than in *M. canalifera*. *T. parvus* Trosch. (pl. 34, fig. 27) seems to be identical.

Var. *ATRAMENTARIA* Fischer. Pl. 62, fig. 86.

Blackish or blackish-green; more distinctly spirally grooved than the type; lip and columella green-bordered.

M. DAMA Philippi. Pl. 21, fig. 24; pl. 22, fig. 38.

Shorter, more globose than *M. labio*; nearly smooth; whorls about 5; spire short, more or less elevated, the apex eroded; following whorls convex; sutures linear, impressed; color cinereous, encircled by spiral series of narrow purplish or brownish oblong markings; surface covered with minute narrow spiral ridges, scarcely elevated above the surface; body-whorl large, globose, a little flat-tend below the suture, then convex; aperture large, oblique; outer lip finely plicate within; columella short, ending in a smooth, but slightly salient basal tooth; *middle of the columellar area with a deep curved groove from the place of the umbilicus downward*, the groove extending upon the basal lip as a submarginal sulcus; basal notch or canal not deep, nor dentate in the middle; basal lip subplicate within. Alt. 20, diam. 20 mill.; alt. 29, diam. 27 mill.

Red Sea; Suez; Gulf of Akabo.

Trochus dama PHIL., *Zeitschr. f. Mal.* 1848, p. 105. *Conchyl. Cub.*, p. 233, t. 35, f. 6.—FISCHER, *Coq. Viv.*, p. 360, t. 111, f. 2.

Distinguished by the fine, sometimes obsolescent surface sculpture, the narrow articulated color-pattern, and especially by the semilunar sulcus upon the center of the columellar tract, which does not terminate at the basal notch but is continued upon the lip as a more or less obvious groove. This sulcus is in an entirely different place from that of *M. canalifera*, which is short, parallel to the edge of the columella, and straight.

M. VERMICULATA Fischer. Pl. 21, figs. 25, 26; pl. 62, fig. 64.

Shell imperforate, solid, thick, subglobose; spire conoid, short; whorls 4 to 5, the penultimate and last quite convex, the last descending, more or less concave just below the linear suture; young shells obsoletely spirally lirate, the sculpture disappearing with age; *coloration consisting of numerous narrow red or orange zones alternating with bands of light green articulated with black*; aperture oblique, round-ovate; outer lip finely plicate within; basal lip thickened, plicate; columella short, terminating in an acute tooth;

middle of the columellar area with a longitudinal semilunar groove, frequently irregularly curved; basal notch or canal oblique, squarish, wider than deep, *not denticulate in the middle*.

Alt. 23, diam. 26 mill.; alt. 17, diam. 17 mill.

Natal; Ins. Socotra; Mascat.

T. vermiculatus FISCHER, *Journ. de Conch.*, 1874, p. 373, et *Coq. Viv.*, p. 228, t. 74, f. 3.—*T. australis* (in part) PHILIPPI, *Conchyl. Cab.*, t. 27, f. 6, 7.

This species of which numerous specimens collected by DR. RUSCHENBERGER at Mascat, Arabia, are before me, is allied to *M. australis* and *M. dama*. From the former it is distinguished by the more depressed form, less numerous whorls, smooth surface almost without spiral ridges, the coloration, the more numerous finer grooves within the lip, and the smaller tooth of the columella. The coloration is different from that of *M. dama*, which is, however, a very closely allied species.

There is great variation in color in this species. In some specimens red predominates; in others green; and often the general effect is an olive shade. There is usually a subsutural series of light and dark dashes. The numerous narrow red spiral lines are characteristic, but are also found sometimes on *M. canalifera*,—a species separated constantly from this by its deep basal notch, denticulate in the middle.

It is rather difficult to distinguish the species of this group; but attention to the differential characters pointed out under each, will enable one to see that although closely allied they are distinct.

Section AUSTROCHLEA Fischer.

Austrochlea FISCHER, *Manuel de Conchyl.*, 1885, p. 820.

M. CONSTRICTA Lamarck. Pl. 20, figs. 6, 7.

Shell imperforate, thick, solid, lusterless ashen or whitish, obscurely marked with black zigzag lines and stripes, or with spiral articulated zones or with spiral stripes of black; sometimes nearly unicolored; spire conical, apex acute; whorls about 5, convex, the first eroded, the penultimate very strongly spirally tricostate, the last with about seven strong carinæ; aperture oblique; outer and basal lips either thick and multi-lirate within, or rather thin and slightly furrowed at the places of the principal carinæ; columella short, oblique, subdentate at base, at the insertion spreading in a strong callous upon the parietal wall. Alt. 28–33, diam. 22–28 mill.

Australian Coasts, Port Jackson; York Peninsula; Tasmania; Bass sts.

M. constricta LAM. *An. s. Vert.* vii, p. 36.—*T. constrictus* PHILIPPI, *Conchyl. Cab.*, p. 159, t. 26, f. 2b, 3.—QUOY ET GAIM., *Voy. de l'Astrol.* iii, p. 251, t. 63, f. 23, 24.—FISCHER, *Coq. Viv.*, p. 178, t. 59, f. 2, t. 60, f. 4.—*Trochus cochlea* WOOD, *Ind. Test. suppl.*, t. 5, f. 24.

The present form may be distinguished from the following by the prominence of the spiral ridges, and their number—three on the penultimate, seven on the last whorl. The ridges are sometimes less prominent upon old specimens.

M. ZEBRA Menke. Pl. 20, figs. 20.

Shell imperforate, thick, solid, lusterless, whitish or covered with a thin greenish-yellow cuticle, *conspicuously longitudinally striped with black or dull red*, the stripes sometimes zigzag; spire conic, acute; whorls 6 to 7, convex, obliquely striated and spirally ridged, the ridges 4 or 5 in number on the penultimate, 8 to 12 on the last whorl, not so prominent as in *M. constricta*, and closer, especially upon the base; aperture as in *M. constricta*; outer lip lirate or smooth within; columella bearing an inconspicuous blunt tubercle near the base. Alt. 34, diam. 25; alt. 25, diam. 22 mill.

S. Australian Coasts; Tasmania.

Monodonta zebra MENKE, *Verz. Malsb. Conch. Samml.*, p. 17 (18).—*Trochus zebra* PHILIPPI, *Conchyl. Cab.*, p. 160, t. 26, f. 4.—FISCHER, *Coq. Viv.*, p. 182, t. 60, f. 2 (not *T. zebra* Wood).—*T. tæniatus* QUOY ET GAIM., *Voy. de l'Astrolabe* iii, p. 249, t. 69, f. 15–17 (not *T. tæniatus* Wood).—*Trochocochlea multicarinata* CHENU, *Man. de Conchyl.*, ii, p. 360, f. 2676.—FISCHER, *Coq. Viv.*, p. 184, t. 60, f. 3.—*T. constrictus* PHILIPPI (in part) *Conchyl. Cab.*, t. 26, f. 2a.—Q. ET G. (in part) *Voy. de l'Astrol.* t. 63, f. 26, 27.—*T. obtusus* "Chemn." PHILIPPI, *Conchyl. Cab.*, p. 19, t. 4, f. 3, 4.

This species may be separated from the preceding by the more numerous, less salient spiral ridges, and by the color pattern of dull red or black stripes alternating with white. The cuticle is usually rubbed off in adults, causing the underlying white to replace the yellow, and intense black the red, of fresh shells. The *T. multicarinatus* of Chenu (pl. 20, fig. 12) differs in the much closer, narrower stripes; but that it is the merest color-variety is proven by numerous intermediate specimens before me.

Var. PORCATA A. Adams. Pl. 20, figs. 10, 11.

More elongated than the type, aperture less dilated, columellar tubercle obsolete. Alt. 15 mill.

Labio porcatus A. AD. P. Z. S. 1851, p. 179 (not *Trochus porcatus* Phil.).—*T. extenuatus* FISCHER, Coq. Viv., p. 330, t. 103, f. 1.

Specimens received from Dr. Cox seem to be scarcely distinct from the *M. zebra*.

Section OSILINUS Philippi.

Osilinus PHIL. Zeitschr. f. Mal. 1847, p. 20; Handbuch der Conchyl. u. Malac. p. 210.—*Trochocochlea* "Klein" H. and A. AD. Gen. Rec. Moll. i, p. 425 (1858); and of FISCHER, TRYON, CHENU, and most authors.—*Caragolus* MONTEROSATO Nom. gen. e spec., p. 43 (1884).—*Trochius* Leach, in GRAY, 1850.—"*Osilin*" ADANSON.

After rejecting Klein's pre-Linnaean name *Trochocochlea* (not properly defined until 1858), we find *Osilinus* Phil., the next in order.

The section is restricted to the seas of Europe in distribution.

M. TURBINATA BORN. Pl. 21, figs. 21–23.

Shell imperforate, conical, very solid and thick, whitish, tinged with gray, yellowish or greenish, tessellated with numerous spiral series of reddish, purple or chocolate subquadrangular blotches; spire more or less elevated, conoid, the apex eroded; whorls about 6, slightly convex, with impressed spiral lines between the series of blotches, the last generally descending anteriorly; base eroded in front of the aperture; aperture very oblique; outer lip beveled to an edge, thick, smooth, pearly and iridescent within; columella flattened on the face, bluntly lobed within, pearly, backed by an opaque white layer.

Alt. 25–30, diam. 24–30 mill.; alt. 36, diam. 30 mill.

Mediterranean Sea, from the *Ægean* to *Algiers* and *Spain*; *Portugal*; *Canaries*.

Trochus turbinatus BORN., Test. Mus. Cæs. Vindobon., p. 335, et *T. tessulatus* BORN., l. c. p. 332, t. 12, f. 5, 6 (young shell) 1780.—*T. tessellatus* GMEL., Syst. Nat. xiii, p. 3583 (in part; not *T. tessellatus* GMEL., p. 3574).—*Monodonta fragaroides* LAMARCK, An. sans. Vert. vii, p. 36.—HIDALGO, Moluscos Marinos de Espana, etc., t. 61, f. 2, t. 62, f. 9–11.—*T. Olivieri* PAYR., Moll. de Corse p. 133, t. 6, f. 15, 16.—*T. turbinatus* PHILIPPI, Conchyl. Cub., p. 162, t. 26, f. 7–11.

FISCHER, *Coq. Viv.*, p. 201, t. 67, f. 6.—DESHAYES, *Ann. de Malacol.* (France) i, p. 9, t. 1, f. 1.—BUCQ., DAUTZENB., ET DOLLFUS, *Moll. Mar. du Roussillon*, p. 402, t. 48, f. 6–11.—*Caragolus turbinatus* MONTEROSATO, *Nom. Gen. e Spec.*, p. 43.

The name *T. tessulatus* Born, was the first applied to this species; but as Philippi, Fischer, and most modern authors have adopted the name *turbinatus* of Born, we had better not inquire too curiously into the question of absolute priority; especially since *tessellatus* is a name that figures in the synonymy of the following species.

A number of varieties are recognized by Messrs Bucquoy, Dautzenberg and Dollfus; the principal ones are var. *GLOBOSA* Réquien, less elevated, more globose than the type; var. *ELONGATA* Réquien, a slender form (pl. 21, fig. 21); var. *ZEBRA* Wood, ornamented with longitudinal zigzag lines.

Plate 21, fig. 28 is *M. fragoroidus* of Lamarek.

M. ARTICULATA Lamarek. Pl. 21, figs. 33–36.

Shell imperforate in the adult, generally perforate when immature, elongate-conical, heavy and thick; color cinereous greenish or whitish, spirally traversed by bands composed of alternating white and black purplish or red squarish spots, the intervals between the bands longitudinally closely lineolate with blackish; spire elevated; whorls about 6, the upper ones slightly convex, the last generally constricted and concave below the suture, then convex; spiral impressed grooves or lines like those of *M. turbinata* in the young, but generally obsolete in adult specimens; aperture as in *M. turbinata*, but smaller and less oblique.

Alt. 25–30, diam. 21–24 mill.

Mediterranean and Adriatic seas; Portugal.

M. articulata LAM. *An. s. Vert.*, vii, p. 36 (1822).—*T. articulatus* PHILIPPI *Conchyl. Cub.*, p. 163, t. 26, f. 13–15.—HIDALGO, *Mol. Mar. de Espana*, etc., t. 61, f. 3, t. 62, f. 6–8.—DESHAYES, *Ann. de Malacol.*, i, 1870, p. 8, t. 1, f. 2.—FISCHER, *Coq. Viv.*, p. 204, t. 68, f. 1.—BUCQ., DAUTZ. ET DOLLFUS, *Moll. Mar. du Roussillon*, p. 404, t. 49, f. 1–7, 10.—*T. tessellatus* VON SALIS MARSCHLINS, *Reisen in Koen. Neapel*, p. 374, t. 7, f. 7 (not *tessellatus* Gmel.).—DESHAYES, *Exped. sci. au Morée*, p. 140.—*M. draparnaudii* PAYR., *Moll. de Corse*, p. 131, t. 6, f. 17, 18.

The form of this species is more elongated than the preceding, and the last whorl usually more concave above; the coloration will also separate the *turbinata* from this species; for the former has no

markings upon the spaces between the blotches, while *articulata* is all over closely lineolate in zigzag pattern, and the spiral series of blotches are comparatively few and widely separated. Some specimens are conspicuously spirally grooved, some are quite smooth.

M. MUTABILIS Philippi. Pl. 30, figs. 20–22; pl. 20, figs. 13, 14.

Shell globose-conoid, umbilicate or subimperforate, solid resembling a young *M. articulata*; color usually grayish-yellow, yellow or flesh-tinted, more or less obviously marked with obliquely radiating lines or maculations of dull crimson, sometimes broken into tessellations, sometimes faintly, minutely articulated with reddish, appearing nearly unicolored; spire short, conoid; suture impressed; whorls 5 to 6, slightly convex, spirally finely grooved, the last somewhat flattened around the upper part; aperture very oblique, large, the lip forming half of a circle, not so much thickened nor beveled within as in *M. articulatus*; columella more flattened than that of *M. articulatus*, scarcely edged with pearl, the tooth or lobe less heavy, more acute than that species; umbilical region always more excavated than *M. articulatus*, the umbilicus open, or nearly closed by the callous at the insertion of the columella.

Alt. 16–18, diam. 17–19 mill.

Mediterranean and Adriatic Seas.

Trochus mutabilis PHILIPPI, *Conchyl. Cab.*, p. 166, t. 26, f. 18–22 (1846).—FISCHER, *Coq. Viv.*, p. 314, t. 99, f. 2.—BUCQ., DAUTZ. ET DOLLFUS, *Moll. Mar. du Rouss.*, p. 407, t. 49, f. 11–14.—*T. articulatus* var. WEINKAUFF, *Conchyl. des Mittelmeeres*, ii, p. 355.

A species which exhibits a curious combination of the characters of *M. articulatus* and *Gibbula richardi* Payr. From the former it differs in the finer sculpture, lighter columella and more excavated umbilical tract; in the last character *mutabilis* approaches *Gibbula richardi*. The dentition of the latter species should be examined; that of *mutabilis*, if correctly figured by Troschel (*Des Gebiss der Schnecken*, ii, t. 22, f. 14), is similar to the other species of *Osilinus*.

M. CRASSA Montagu. Pl. 21, figs. 27–30.

Shell imperforate, subperforate in the young, globose-conic, very thick and solid, dull grayish, densely marked all over with very numerous fine flexuous or zigzag anastomosing purplish-black lines; spire conic; whorls 6 to 7, convex, the apex usually eroded and orange-colored; last whorl flattened around the superior portion; base eroded in front of the aperture; aperture oblique; columella

short, obtusely subdentate near the base, spreading at the insertion into a heavy callous, which covers the umbilicus.

Alt. 25, diam. 23; alt 30, diam. 27 mill.

Western Europe; Portugal; Mogador; British Is.

Trochus crassus PULT., *Cat. Dorset.*, p. 44.—MONTAGU, *Test. Brit.*, i, p. 281 (1803).—PHILIPPI, *Conchyl. Cab.*, p. 164, t. 26, f. 15, 16.—FORBES and HANLEY, *Hist. Brit. Moll.*, t. 65, f. 4, 5.—FISCHER, *Coq. Viv.*, p. 202, t. 67, f. 2.—*Lineatus* DA COSTA, *Brit. Conch.*, p. 100, t. 6, f. 7.—*T. lineatus* JEFFREYS, *Brit. Conch.*, iii, p. 317; v, t. 62, f. 6.—HIDALGO, *Mol. Mar. de Esp.*, t. 61, f. 1, t. 62, f. 1–5.—B., D. et D., *Moll. du Roussillon*, t. 49, f. 8, 9.—*Monodonta lugubris* LAMARCK, *An. s. Vert.*, vii, p. 37.

I have not seen the *Catalogue* of Pulteney, which is quoted by Montagu for this species. The name *lineatus* of Da Costa, used by many authors, should be considered inadmissible on account of the failure of that author to use *generic* in combination with his *specific* names.

This species is similar to *M. turbinata* in form, but usually has the outlines of the spire more convex. The columella projection or tooth is nearer the base than in the *turbinata*, and the diverse color-patterns will serve to further distinguish the two species.

M. TAMSI Dunker. Pl. 20, figs. 3, 4; pl. figs.

Shell imperforate, conic, solid, spire conical, apical whorls eroded, the following dull cinereous or purplish-black, marked with several spiral rows of white spots, or with longitudinal zigzag white stripes, the base generally tessellated or striped with white; whorls 5 to 6, the upper ones marked with spiral impressed lines in young specimens, and two carinæ, the latter giving the last whorl a squarish form; aperture oblique, the lip not much thickened within; columella short, obsoletely subdentate at base, above at the insertion with a heavy white callous spread upon the base, invading the umbilicus, and wholly closing it, or leaving only a narrow pit.

Alt. 17–19, diam. 16 mill.; alt. 23, diam. 19 mill.

Cape Verde and Canary Is.; Coast of Guinea; Cape of Good Hope.

Trochus tamsii DUNKER, in PHILIPPI, *Abbild.*, i, p. 189, *Trochus*, t. 5, f. 3 (1845).—PHILIPPI, *Conchyl. Cab.*, p. 160, t. 26, f. 5.—DUNKER, *Ind. Moll. Guin.*, p. 16, t. 2, f. 40–42.—FISCHER, *Coq.*

Viv., p. 177, t. 59, f. 1.—*T. atratus* WOOD, *Ind. Test. suppl.*, f. 25 (1828). (Not *T. atratus* Gmel.)

The name of *atratus* Wood has priority in *Monodonta*, but has not been adopted by authors.

This species is quite variable in coloration, the white appearing either in oblique zigzags or in spots. The bicarinate whorls will separate it from the preceding species. The young are perforate.

M. PUNCTULATA Lamarek. Pl. 20, figs. 8, 9.

Shell imperforate, conical, solid, deep purplish-brown or blackish, dotted with white, the dots sometimes forming spiral series, and always elongated in the direction of the spiral; surface nearly smooth, sometimes showing traces of spiral grooves, which are always visible on the young; spire conoid, apex generally eroded and orange-colored; whorls 6, convex, the last somewhat flattened or subconcave around the upper part, the base convex, eroded and white in front of the aperture; aperture half-circular, the outer lip not much thickened, edged with black, beautifully iridescent within, with amethystine tints; columella short, obtusely subdentate at the base, expanding above into a callous, which covers axis and umbilicus, or leaves a slight excavation or groove. Alt. 17, diam. 18 mill.

Coasts of Senegal, W. Africa.

Monodonta punctulata LAM., *An. s. Vert.*, vii, p. 37.—*T. punctulatus* PHILIPPI, *Conchyl. Cab.*, p. 165, t. 26, f. 17.—Fischer, *Coq. Viv.*, p. 176, t. 58, f. 2.—OSILIN ADAMSON, *Voy. au Sénégal*, p. 178.—*Monodonta osilin* DESHAYES in LAM. *An. s. Vert.* ed. 2, p. 182 (excl. syn.)

A species resembling some forms of the preceding in the somber coloration, but differing in the more iridescent interior (in which red is more conspicuous than green), the smaller dots of white, and the rounded, not bicarinate body-whorl.

Subgenus *DILOMA* Philippi.

Section *DILOMA* Phil. (restricted).

Diloma PHIL., *Abbild. etc.*, i, p. 168 (1845); *Handbuch der Conchyl.*, u. Mal., p. 209.—H. and A. AD., *Gen. Rec. Moll.*, i, p. 419.—FISCHER, *Manuel*, p. 820.—TRYON, *Struct. and Syst. Conch.*, ii, p. 315.

Diloma has been restricted by Fischer to the South American species. The only diagnostic character separating these from the

Australasian forms is the band of naere extending across the parietal wall, connecting the terminations of the peristome. The species are dark colored, like nearly all Trochidæ of the west coast of the Americas. This melanism is probably a protective adaptation, for the prevailing hue of the rocks of these shores is very dark.

M. NIGERRIMA (Gmel.) Philippi. Pl. 23, figs. 77, 78; pl. 20, fig. 18.

Shell imperforate, depressed globose, solid, slate-colored or black, sometimes (especially if rubbed) reddish or brownish; spire short, conic, apex acute, usually reddish; sutures linear; whorls 5, slightly convex, rapidly increasing, spirally obsoletely striate, the last whorl usually depressed or subconcave below the suture; base rounded, eroded and iridescent in front of the aperture; aperture large, oblique iridescent; the outer lip rather thin, not black-margined within; but bordered by a brilliantly iridescent band; columella concave, obsoletely subdentate below, very broad and flattened or excavated on the face, composed principally of an opaque white layer which also lines the base but does not extend to the edge of the lip. Alt. 15–26, diam. 17–24 mill.

Coast of Chili.

Turbo nigerrimus GMEL., *Syst. Nat.*, xiii, p. 3597 (not *Trochus nigerrimus* Gmel., a species of *Chlorostoma*).—*Trochus nigerrimus* PHILIPPI, *Conchyl. Cab.*, p. 149, t. 24, f. 14.—*Trochus araucanus* D'ORBIGNY, *Voy. dans l'Amér. mérid.*, p. 410, t. 55, f. 5–8 (1846).—GOULD, *U. S. Expl. Exped.*, t. 13, f. 215.—FISCHER, *Cog. Viv.* (Turbo), p. 110, t. 29, f. 2.—*Turbo Quoyi* KIENER, *Spec. et Icon.* (Turbo), t. 29, f. 2. (Not *Trochus Quoyi* Phil.)

The above description is drawn from specimens brought by DR. RUSCHENBERGER from Valparaiso, the original locality. The surface is either black and shining, or presents a corroded appearance. The spiral sculpture is obsolete on the last whorl, in large specimens, but traces of it may usually be seen upon the base. I do not think this species has been found except upon the S. American coast, although Professor HUTTON and others quote it from New Zealand. The dentition of the New Zealand form is quite different from that of the real S. American *M. nigerrima*. While there may be some slight doubt about the identity of this species with the *T. nigerrimus* of Gmelin, it is undoubtedly the shell described under that name by Philippi. *Turbo Quoyi* Kn. and *T. araucanus* d'Orb., are certainly the same; and it is equally certain that the *Diloma nigerrima* of

Hutton and others is a distinct species. A notable character of this species is the band of iridescent naere which connects the terminations of the peristome, extending across the parietal wall.

M. CRUSOEANA Pilsbry. Pl. 35, figs. 19-21.

Shell similar in form to *M. nigerrima* or somewhat more depressed; the color, columella and parietal wall as in *M. nigerrima*; *Outside closely conspicuously spirally lirata*, the sutures bordered below by a depression or groove; outer lip acute, thin, very narrowly black-edged, bordered within by a broad band of *very thin* white substance, which overlies the naere; parietal wall with a band of naere connecting the ends of the peristome, but obscured by the same thin opaque layer; fauces brilliantly iridescent; lip lirata within; upper angle of the aperture narrowly channeled; ribs of the outer surface about 8 in number on the penultimate, 20 (more or less) on the last whorl. Alt. 15, diam. 17 mill.

Ins. Juan Fernandez; Coquimbo, Chili.

Two trays of this well-marked form are before me. It is needless to compare with the Australo-Zealandic species, for the band of naere across the parieto-columellar region, connecting the terminations of the peristome, at once separates our species from these, and allies it to *M. nigerrima*, the only other form exhibiting this character. From *M. nigerrima* it is separated by the much stronger liration of the entire surface, and the canaliculation of the sutures.

Section NEODILOMA Fischer, 1885.

Neodiloma FISCHER, Manuel de Conchyliologie, p. 820.

Differs from typical *Diloma* principally in its Australasian distribution. The dentition also differs somewhat from *Diloma*. (Pl. 50, fig. 12, *Neodiloma aethiops* Gmel.)

M. ÆTHIOPS Gmelin. Pl. 19, figs. 99, 100; pl. 20, fig. 19.

Shell imperforate, globose-conoid, solid, thick, blackish, encircled by series of narrow white marks, formed by the interruption of numerous longitudinal white lines by narrow spiral black stripes; spire conic, whorls 5, convex, the first eroded, spirally sulcate, the last marked by narrow, separated spiral grooves, the cuticle lamellose-striate; base convex, eroded and subconeave in front of the aperture; aperture large, oblique, expanded; outer lip black-edged, then thickened with opaque white; columella short, obtusely bidentate, the

umbilical tract very broad, subconcave, bounded on the outer lower margin by a chocolate streak. Alt. 25–33, diam. 25–30 mill

New Zealand.

T. aethiops GMEL., *Syst. Nat.*, xiii, p. 3596.—PHILIPPI, *Conchyl. Cab.*, p. 147, t. 24, f. 10, 11.—FISCHER, *Coq. Viv.*, p. 185, t. 61, f. 1.—*T. zelandicus* QUOY ET GAIM., *Voy. de l'Astrol.*, iii, p. 257, t. 64, f. 12–15.—*T. reticularis* GRAY, *Dieffenb. N. Z.* ii, p. 238.—*Ind. Test. suppl.*, t. 5, f. 21.

Easily recognized by the distant narrow spiral black grooves, the intervening tracts flat, black, articulated with white.

M. STRIOLATA Quoy et Gaimard. Pl. 19, figs. 97, 98.

Shell imperforate, globose-conic, generally rather depressed, very thick and solid, yellow and black, tessellated or longitudinally striped, sometimes the black, sometimes the yellow predominating; spire very short conic, apex usually perfect and acute, often ruddy; whorls 5, slightly convex, very rapidly increasing, spirally strongly costate, the ridges 13 or 14 in number on the last whorl; body-whorl slightly descending at the aperture, not eroded on the base; aperture large, oblique; outer lip margined within with yellow and black, followed by a nacreous and then by an opaque white thickening which more or less contracts the aperture and which is more or less notched at about the place of the periphery; columella white, much narrower than in *M. aethiops*, bidenticulate below.

Alt. 20–22, diam. 23–25 mill.

S. Australian and Tasmanian Coasts.

T. striolatus Q ET G., *Voy. de l'Astrolabe*, iii, p. 253, t. 63, f. 18–22.—PHILIPPI, *Conchyl. Cab.*, p. 158, t. 26, f. 1.—FISCHER, *Coq. Viv.*, p. 187, t. 61, f. 3.—*T. concameratus* WOOD, *Ind. Test. suppl.*, t. 6, f. 35 (no desc.).—*T. viridis* WOOD, *Ind. Test. suppl.*, t. 6, f. 36 (not *T. viridis* Gmel.).—*Labio fuliginus* A. AD., *P. Z. S.*, 1851, p. 180.—*T. fuliginus* WATSON, *Challenger Moll.*, p. 67, t. 4, f. 11.—? *T. zebrinus* PHIL, *Conchyl. Cab.*, p. 161, t. 26, f. 6.

The more prominent characters of this species are the strong spiral ribs and the thick outer layer of yellow and purplish-black, or of black veined with yellow, which usually assumes a tessellated pattern. Sometimes, however, the black predominates to the almost entire exclusion of yellow, and specimens also occur in which the black is scarcely visible on the surface. Both of the names given in

the *Inder Testaceologicus* are anterior to that of Quoy and Gaim., but being unaccompanied by descriptions have not been adopted. Watson's figures of the undoubtedly synonymous *T. fuliginus* are given on my pl. 19, figs. 1, 2.

M. LUGUBRIS Gmelin. Pl. 19, fig. 93; pl. 35, figs. 24, 25.

Shell imperforate, depressed conic, solid, thick, blackish, dotted upon the ribs with yellow or white; spire conic, more or less depressed, apex acute; whorls 5, spirally strongly ridged, the ridges nodulous, 3 on the penultimate whorl, interstices spirally striate; last whorl depressed, angulate at the periphery, concentrically lirate below, the liræ coarsely granulose, about 5 in number; aperture very oblique, the outer lip edged with blackish, then nacreous, and lined with opaque white, the thickening slightly notched at the place of the periphery; columella oblique, nearly straight, flat, opaque white, backed by nacreous. Alt. 9, diam. 13; alt. 13, diam. 15 mill.

New Zealand.

Trochus lugubris GMEL., *Syst. Nat.*, xiii, p. 3583.—FISCHER, *Cog. Viv.*, p. 189, t. 62, f. 1.—*T. cingulatus* QUOY ET GAIM. *Voy. de l'Astrol.*, t. 64, f. 16–20 (not *T. cingulatus* Brocchi nor Menke).—*T. gaimardi* PHILIPPI, *Conchyl. Cab.*, p. 211, t. 31, f. 7–9.—*Diloma gaimardi* HUTTON, *Manual N. Z. Moll.*, p. 96.—*T. bernardi* RECLUZ, *Journ. de Conch.*, 1852, p. 166, t. 7, f. 5.—*T. sulcatus* WOOD, *Ind. Test.* suppl., t. 6, f. 40 (not *T. sulcatus* Martyn nor Lam.).—*T. bicanaliculatus* DUNKER, PHILIPPI, *Conchyl. Cab.*, p. 202, t. 30, f. 6.

A small species, sufficiently distinct from all others in its carinated, ridged, granulose whorls. It is more nearly allied to *M. striolata* than to any other species. The sculpture is quite variable. *T. bicanaliculatus* Dunker (pl. 35, fig. 12, 13) seems to be synonymous. It is placed here by Fischer.

M. LEPROSUS Philippi. Pl. 34, figs. 23,

Shell depressed conoidal, umbilicate, solid, blackish-brown, sculptured with 4 to 6 granose cinguli; whorls rapidly increasing, the last rounded; base ornamented with 5 elevated rather smooth cinguli; aperture subcircular inside; columella with denticles on its lower outer part, above impinging over the umbilical tract. (*Phil.*)

The shell is very thick, depressed-conoidal. The $4\frac{1}{2}$ –5 whorls widen very rapidly; the last is rounded. The sculpture consists of 4 to 6 elevated warty or granose spiral cinguli upon the upper surface, and 5 pretty smooth lire beneath; the interstices are smooth,

sometimes traversed by an elevated line. The umbilicus is pretty narrow, almost circular, bounded by an obtuse angulation. The aperture is circular inside and appears narrow because the shell is very thick; the throat is completely smooth; the columella is arcuate at base, separated by a notch from the outer lip, and with two or three denticles there, above continued in a lobe which partly surrounds the umbilicus. The color is blackish-brown, the decorticated apex reddish-brown.

Oblique alt. 9, diam. 12 mill. (*Philippi*.)

Habitat unknown.

From *T. scabriculus* v. d. Busch, this species is separated by the thick shell, rapidly widening whorls, the rounded, not angular periphery, etc. (*Phil.*)

T. leprosus PHIL., *Zeitschr. f. Mal.*, 1851; *Conchyl. Cab.*, p. 328, t. 46, f. 13.

May be a young shell. Known to me only by Philippi's description translated above.

M. RADULA (Parreyss) Philippi. Pl. 22, figs. 51, 52.

Shell globose-conic, imperforate, small, thick and solid, blackish, unicolored; spire elevated or rather depressed, conical; apex acute, flesh colored; whorls 5, slightly convex; spirally encircled by regularly granose subequal liræ, about 6 in number on the penultimate, 11 to 13 on the last whorl; body-whorl globose, convex below, periphery rounded; aperture rounded; outer lip slightly crenated by the spiral ribs, dark-margined, beveled to an edge, thickened by a heavy white rim inside, which is slightly notched at the periphery, but elsewhere is smooth; columella oblique, straightened, not obviously dentate.

Alt. 7, diam. 6; alt. $5\frac{1}{2}$, diam. $6\frac{1}{2}$ mill.

Sandwich (?) and Fiji Is.

Trochus radula PARR. in PHILIPPI, *Zeitschr. f. Mal.*, 1848, p. 124.

—*Conchyl. Cab.*, p. 204, t. 30, f. 9.—FISCHER, *Coq. Viv.*, p. 278. t. 91, f. 3.

Allied to *M. lugubris*, but perfectly distinct in the small globose, evenly granulose character of the shell. Numerous specimens are before me from the Fiji Is., from J. W. MIGHELS.

M. SUBROSTRATA Gray. Pl. 19, figs. 89, 90.

Shell conical, suborbicular, solid, black, with close wavy longitudinal yellow lines; spire short; whorls 5, last large, rounded, hinder

part with three to six spiral keels; axis imperforated; throat smooth and silvery. (*J. E. Gray.*)

E. Coast New Zealand.

M. subrostrata GRAY, in *Yate's Account of New Zealand, etc.*, (1835).—SMITH, *Voy. Erebus and Terror*, Moll., p. 4, t. 1, f. 14.—HUTTON, *Manual N. Z. Moll.*, p. 96; *Trans. N. Z. Inst.*, xv, t. 15, f. 6.; *Proc. Linn. Soc. N. S. Wales*, 1884, p. 367.

The figures are from Smith. I have not seen this species. Hutton's description of it is as follows: Shell with subnodulose spiral ribs which are distant on the upper surface and closer on the base; yellowish, with undulating longitudinal purple lines; mouth yellow, more or less marked with purple.

M. MORIO Troschel. Pl. 35, figs. 26, 27.

Shell semiglobose, imperforate, thin, obsoletely transversely sulcate, black, with irregularly scattered white dots; aperture subtetragonal; columella very oblique, nodulous, continued in a porcellaneous band parallel to the lip; lip acute, within blackish-green. Nearly allied to *T. æthiops*, but more depressed, with more numerous, less distinct transverse striæ, often wanting above; the white dots irregularly scattered upon the greenish-black ground.

Oblique alt. 10, diam. 14 mill. (*Philippi.*)

Habitat unknown.

T. morio TROSCHEL in PHILIPPI, *Conchyl. Cab.*, p. 142, t. 24, f. 3.

Known to me only by Philippi's description and figures. It is probably the same as Watson's *T. porcifer*, and if so has priority.

M. PORCIFERA Watson. Pl. 22, figs. 53, 54.

Shell depressed globose, imperforate, spirally superficially lirate, black, very sparsely dotted with white; spire short and much depressed, or slightly elevated; apex acute; suture linear, margined below; whorls about 5, very rapidly widening, the last very large, depressed, the base with a small eroded patch in front of the aperture: aperture very large, very oblique, the outer lip not thickened within, margined with black, nacreous and iridescent, smooth, but showing very distinct entering folds in the texture of the nacre, corresponding to the liræ of the outer surface; columella oblique, sub-straightened, but not really dentate, quite broad and flat or subconcave, composed of white, opaque substance, expanded above upon the parietal wall but not extending to the superior lip, nor

bordered anteriorly by a nacreous strip uniting with that of the upper lip, as in the case in *M. nigerrima*; place of the umbilicus marked by a slight pit; opaque substance of the columella extending upon the base of the aperture, forming a strong ledge within.

Alt. 12, diam. 15; alt. 10, diam. $13\frac{1}{2}$ mill.

New Zealand.

? *Labio porcifera* A. AD. P. Z. S., 1851, p. 179.—*Trochus porcifer* WATSON, *Challenger Moll.*, p. 67, t. 4, f. 12.—*Diloma nigerrima* HUTTON, *Manual N. Z. Moll.*, p. 96; and *Trans. N. Z. Institute*, xv, p. 125, t. 15, f. B. (Dentition.) (Not *T. nigerrima* (Gm.) Phil.)

The present species has been confounded by most authors with the Chilian *M. nigerrima*. From that form it may be readily distinguished by the following characters: The spiral liræ are much coarser and generally more conspicuous, although occasionally obsolete on the last whorl; they number 15 to 18 on the body-whorl; the form is more depressed; the spiral undulations of the nacre within the outer lip much more obvious and coarser; the columella less concave; the parietal wall without the nacreous band which connects the terminations of the lip in *M. nigerrima*, and upon careful inspection a few white or yellowish dots may be detected upon the black surface, especially on the base, thus showing the affinities of the species to be with *M. striolata* and *M. æthiops* rather than with *M. nigerrima*. The surface is rather smooth and polished, with light growth-lines.

The animal is black; head with a transverse band of yellow near the front margin; rostrum margined with white; tentacles long and tapering, longitudinally striped with black and yellowish; filaments blue-black, three on a side, sometimes a fourth on the left side; foot white, closely and finely marbled with blue-black, and broadly margined with yellow veined with black. Its movements are said by Hutton, from whom I have taken the above description of the animal, to be very rapid, quite different from the other species of *Neodiloma*.

M. CORACINA (Troschel) Philippi. Pl. 19, fig. 94; pl. 31, fig. 28.

Shell small, imperforate, orbicular-conoid, depressed, solid, lusterless purplish-black, unicolored, or sparsely dotted (especially beneath) with yellowish; spire conic, short, eroded, whitish; suture scarcely impressed; whorls 4-5, slightly convex, the last large, spirally lirate, the liræ more or less obsolete, about 5 to 8 on the

penultimate, 10–15 on the last whorl; body-whorl depressed, obtusely angulate around the periphery, eroded in front of the aperture; aperture very oblique; outer lip acute, not thickened inside, black edged, within pearly, iridescent, the nacre smooth but showing fine folds like lire within; columella very oblique, arcuate, extending upon the basal lip; columellar area rather wide, concave.

Alt. 6–9, diam. $8\frac{1}{2}$ –10 mill.

New Zealand; Cook's Sts.

T. coracinus TROSCHEL in PHILIPPI, *Conchyl. Cab.*, p. 148, t. 24, f. 13.—FISCHER, *Cog. Viv.*, p. 357, t. 110, f. 6.

Allied to *M. porcifer*; but differing in the smaller size, more depressed body-whorl, angulate periphery and more conic shape. I have copied the locality given above from Fischer, as the specimens before me are without data. Hutton does not mention the species in his Catalogue of N. Z. Mollusca.

M. MELANOLOMA Menke. Pl. 22, figs. 56, 57.

Shell imperforate, globose-conical, solid, surface dull, roughened, corroded, dark purplish, overlaid by a more or less eroded yellowish white layer, coarsely obsolete subirate; spire conic, apex eroded; whorls about 5, the last globose, not eroded in front of the aperture; aperture oblique, nacreous and apparently smooth within; outer lip bordered by a narrow yellow or white followed by a black strip; columella short, oblique, sub-straightened, white, dilated upon the parietal wall but not extending to the upper lip, slightly pitted at the place of the umbilicus, subconcave.

Alt. 15, diam. 16 mill.

New Zealand.

Monodonta melanoloma MENKE, *Moll. Nov. Holl.*, p. 14 (1843).—PHILIPPI, *Conchyl. Cab.*, p. 146, t. 24, f. 9.—*Labio corrosa* A. ADAMS, *P. Z. S.* 1851, p. 180.—*Diloma corrosa*, HUTTON, *Manual N. Z. Moll.*, p. 96.—*D. hectori* HUTTON, *Cat. Mar. Moll. N. Z.*, p. 37.—*Trocho-cochlea chloropoda* LATE, *Zool. and Pal. Misc.*, p. 10 (*Teste* HUTTON).—*Monodonta melaloma* HUTTON, *Proc. Linn. Soc. N. S. Wales*, 1884, p. 366.

I follow Hutton in referring this form to Menke's *M. melanoloma*, although I am not absolutely sure that such reference is correct.

This species may be known by the corroded, dull appearance and by the margin of yellow within the lip; the columella is like that of *M. porcifer*, but not so broad. My description and figures are from

specimens received from Professor HUTTON, who considers it doubtfully distinct from *M. undulosa* Ad. The animal is like that species.

Var. *PLUMBEA* Hutton. Pl. 20, figs. 15–17.

Shell globose-conic, imperforate, solid, dull purplish, the spire eroded, white, the base usually somewhat eroded, bluish; spire conic, acute; whorls 4–5, the last obsoletely coarsely lirate; aperture as in *M. melanoloma*, but outer lip margined within only by black; columella as in *M. melanoloma*, but bordered outside by black.

Alt. $14\frac{1}{2}$, diam. 16 mill.

New Zealand.

Diloma plumbea HUTTON, *Trans. N. Z. Institute*, xv, p. 126 (1883).

Animal, according to Hutton, like *M. æthiops*, the foot being margined with a band of black and white transverse stripes. Dentition: central teeth as in *M. corrosa*; cutting points of laterals denticulated on both sides; cutting points of inner marginals denticulated on outer edges only; those of outer marginals on both edges. Shell like *M. corrosa*, but lacking the marginal yellow stripe within the lip. The specimens described and figured were received from Professor HUTTON.

Var. *UNDULOSA* A. Adams. Pl. 22, figs. 45–47.

Yellowish, with longitudinal undulating lines of dark purple, or altogether purple; mouth yellow, articulated with purplish-black. (*Hutton.*)

Banks Peninsula to Dunedin, N. Z.

Chlorostoma undulosum A. AD., *P. Z. S.* 1851, p. 182.—E. A. SMITH, *Zoöl. Erebus and Terror, Mollusca*, p. 4, t. 1, f. 15 (1874).—

Diloma undulosa HUTTON, *Manual N. Z. Moll.*, p. 96 (1880).—*T. attritus* HOMER. ET JACQ., *Voy. au Pole Sud.*, p. 57, t. 14, f. 19–20 (1853).—FISCHER, *Coq. Viv.*, p. 186, t. 61, f. 2.

Var. *GUTTATA* Hutton.

Dark purple, usually spotted with white; mouth black; columellar lip greenish at base; interior highly iridescent, markedly grooved.

This variety looks like a hybrid between *M. nigerrima* [*M. porcifera*!] and *M. melanoloma*. (*Hutton.*)

Nelson, N. Z.

M. CARBONARIA Philippi. Pl. 34, fig. 30.

Shell elevated-conoidal, imperforate, solid, smooth, black; whorls slightly convex, the last rounded; aperture rhombic-rounded,

triangulate; columella oblique, subtruncate and binodulose at base; lip acute, wide, with a porcellanous greenish margin, edged with black, inside of which it is silvery, pearly, throat porcellanous, subsulcate. (*Phil.*)

The shell is rather thick; the whorls are slightly convex, the upper ones eroded, grayish-white, the last impressed at the suture, rounded beneath. The columella is round, oblique, and makes a distinct angle with the preceding whorl; below it is truncated, and has two little tubercles; the upper angle of the aperture is rounded, not channeled, even if distinctly angular. The place of the inner lip is absorbed, smoothed (forming a negative inner lip). In the umbilical region there is a porcellanous, slightly callous deposit.

Alt. 34, diam. 31 mill. (*Philippi*.)

King George's Sound, S. Australia.

Can this *T. carbonarius* be only an adult specimen of *T. diloma* Menke? The latter is distinguished by (1) its smaller size, (2) the entirely black margin of the outer lip, (3) a distinct furrow at the upper angle of the aperture, (4) the much less conspicuous angle the columella makes with the upper whorl, (5) in lacking truncation and denticles at the base of the columella. (*Philippi*.)

T. carbonarius PHIL. *Zeitschr. f. Mal.*, 1848, p. 105; *Conchyl. Cab.*, p. 276, t. 40, f. 9.

Known to me only by the above description and figure. (Compare *Chlorostoma funebre*.)

M. NERITOIDES Philippi. Pl. 34, figs. 20-22.

Shell semiglobose, very oblique, imperforate, smooth, black, painted with numerous white zigzag lines; whorls rapidly widening; spire retuse; aperture semioval; lip thin, duplicated and coarsely crenate; columella flat, grooved by a parallel sulcus, terminating in an acute tooth below. (*Phil.*)

The shell is very similar to a *Nerita* on account of its semiglobose form, very obtuse spire, flat base and rapidly widening whorls. I count 5 volutions; the uppermost are flat, and spirally striate; the penultimate convex, the last completely smooth, obliquely descending, flatly depressed above, almost concave. The aperture is almost exactly like that of *T. canaliferus*. The outer lip is on its outer part, inside the edge lined with mother-of-pearl, visibly furrowed; on this part borders a white porcellanous coat, underneath standing out like a rib, on the base cut by two furrows; the throat is nacreous all around. The columella is compressed, flat, arcuate, produced into a

sharp tooth below, and outwardly with a furrow parallel with its free margin. The color is black, with narrow white dense zigzag curved streaks. The spire is pure black. Oblique alt. 13, diam. 15 mill.

There are forms with more elevated whorls, departing a little from the usual form. (*Philippi*.)

Habitat unknown.

T. neritoides PHIL., Zeitschr. f. Mal., 1849, p. 170.—*Conchyl. Cab.*, p. 303, t. 44, f. 4.

This form may be the same as that I have described below as *M. perplexa*. It is said to be very blunt in the spire, and differently colored.

M. PERPLEXA Pilsbry. Pl. 35, figs. 6–8.

Shell depressed-conoid, imperforate, oblique, light green, radiately fluminate above with wide zigzag dark green stripes, more narrowly striped below, encircled about the middle with a well-defined lighter zone; the entire surface polished, and *marked with numerous slightly impressed light-colored spiral lines*; spire very short, conic, acute; sutures more impressed than usual in this group; whorls 5, *quite convex*, the upper ones ruddy or purplish, the last very large, slightly compressed just below the suture, gently descending anteriorly; aperture very large, very oblique; outer lip thin, acute, pearly, iridescent, and *apparently lirate within*; columella extremely oblique, *its inner edge concave, distinctly toothed* or hooked below, bearing a shallow groove parallel with the edge, from the place of the umbilicus downward; columellar area very wide, white.

Alt. $8\frac{1}{2}$, diam. 10 mill.

Japan.

This form is very oblique, like *M. constellata*. From that species it differs in the characters italicized in the above description. There is a distinct ledge within the base, as in *M. nigerrima*, *M. porcifera* etc. The notch at the base of the columella is more decided than in any other species of *Neodiloma*, and raises a doubt concerning the true position of the species. The specimens before me were received from the Smithsonian Institution. Compare preceding species.

M. GUTTATA Koch. Pl. 34, figs. 16, 17.

Shell small, narrowly umbilicate, depressed conical, very smooth, upper surface with distant impressed lines, black, subtessellated with scattered white spots; aperture rhomboidal, patulous; um-

bilicus narrow; columella arcuate, terminating at base in an obtuse denticle. (*Philippi*.)

The shell is much depressed, with $5\frac{1}{2}$ rapidly widening whorls, which are above flat, the rest convex; the last is slightly angled, and has above eight equally widely spaced impressed spiral lines, which do not modify the smoothness of the surface. The base also has a pair of impressed lines; the umbilicus is narrow, the columella arcuate, with a blunt denticle below. The color is black above, brown beneath, both sides guttate with yellowish-white spots arranged in rows. Alt. 3, diam. 5 mill. (*Philippi*.)

Habitat unknown.

T. guttatus KOCH, *Zeitschr. f. Mal.*, 1846, p. 104.—PHILIPPI, *Conchyl. Cab.*, p. 178, t. 28, f. 4.

Philippi's description, remarks and figures are copied.

M. STURNUS Mühlfeld. Pl. 34, figs. 18, 19.

Shell imperforate, convexo-orbicular, black, ornamented with white-spotted slightly elevated transverse lines; columella very oblique, continued upon the base in a lobe parallel with the lip. (*Phil.*)

I have seen two examples of this species, in the Anton collection. The shell is pretty depressed, and seems to consist of only 4 whorls; these are so flat, and separated by such slightly impressed sutures that one has difficulty in distinguishing them. It is hard to count the elevated transverse lines, they are so inconspicuous. The aperture is large, rounded-quadrangular; the inner lip is, as Mühlfeld correctly says, concave, or rather, surrounded by a little trench, and the basal lip is continued parallel beyond it. The columella is very oblique, compressed, its edge rounded, not acute, and it is continued upon the base in a callous lobe parallel with the outer lip, which has 8 to 10 furrows inside, corresponding to the liræ of the outer surface. The color is black, usually with yellow dots on the spiral liræ.

Alt. $4\frac{1}{2}$, diam. nearly 8 mill. (*Philippi*.)

T. sturnus MUHLF. *Mag. Berl. Gesell. nat. Freunde*, viii, p. 8, t. 2, f. 12.—PHILIPPI, *Conchyl. Cab.*, p. 269, t. 39, f. 14.

Probably a young shell of one of the New Zealand or Australian species. It cannot be from the Antilles, as Mühlfeld supposed.

M. CONSTELLATA Souverbie. Pl. 35, figs. 9, 10; pl. 62, figs. 69–71.

Shell imperforate, orbiculate-conic, slightly elevated, oblique, the base very wide, longitudinally very obliquely subtly striate, and

marked with a few spiral subimpressed lines which are sometimes obsolete, leaving the surface smooth; color plumbeous ashen, often with a pink tinge, speckled closely with white dots, and encircled with two dark bands which are articulated with larger spots of white; sutures impressed; whorls 5, subconvex, the last forming the greater portion of the shell, compressed, obtusely angulated, depressed below the suture, the surface of the base almost entirely occupied by the parieto-columellar area; aperture very oblique, pearly, iridescent inside; outer lip acute, thin, continued on the base in an angle which bounds the columellar area; columella subhorizontal, thin, very wide, subconcave, white, bounded by a narrow brown streak outside.

Alt. 9, diam. 10 mill.

New Caledonian Archipelago.

T. constellatus SOUVERBIE, *Journ. de Conch.*, 1863, p. 279, t. 12, f.

3.—FISHER, *Coq. Viv.*, p. 271, t. 90, f. 1.

A very depressed, almost Trochita-shaped species. There is considerable variation in the color-pattern. Unlike most of the preceding species, the base is not lined with a white thickened continuation of the columella.

M. EXCAVATA Adams et Angas. Pl. 35, figs. 1, 2, 3.

Shell small, imperforate, depressed-conic, oblique, light green, closely maculated and mottled in minute pattern with dark olive, the markings sometimes assuming the form of obliquely descending dark bars; spire conoidal, the apex eroded, whitish; the penultimate whorl quite convex, ruddy or purplish; suture well impressed; whorls 4, the last conic above, flattened beneath, carinate at the periphery; almost the entire surface of the base occupied by the large, very oblique aperture; outer lip acute, arcuate, not thickened within, inside brilliantly iridescent, smooth or nearly so; columella subhorizontal, its edge arcuate, thin, acute, extending below upon the base, forming a ledge within the basal lip; parieto-columellar area very large, eroded, concave, white. Alt. 5, diam. 6 mill.

New Zealand.

Trochocochlea excavata AD. and ANG., *P. Z. S.*, 1864, p. 37.—

HUTTON, *Manual N. Z. Moll.*, p. 97.

A species allied to *M. constellata*, but smaller, lacking dark spiral bands, more angular at the periphery, more concave beneath, and with the columella prolonged in a distinct ledge within the basal lip. To *M. perplexa* it is also related; but is smaller, more angulated,

more concave beneath, and does not possess the peculiar notch at the base of the columella characteristic of that form.

M. ATROVIRENS Philippi. Pl. 22, figs. 48–50.

Shell imperforate, orbiculate-conoidal, depressed; whorls 6, separated by impressed sutures, slightly convex, greenish-black, shining, spirally sulcate, the sulci about 5 on the penultimate whorl; last whorl much dilated, slightly depressed above, rounded in the middle, very obliquely striate, obsolete transversely sulcate, slightly convex beneath; aperture subrhomboidal, lirate within; lip acute, green; basal margin thickened within; columella compressed, white, arcuate; columellar callous broadly expanded, subdepressed at the place of the umbilicus. Alt. 9, diam. 14 mill. (*Fischer.*)

Bay of Tasmania; New Zealand.

Trochus atrovirens PHIL. *Conchyl. Cab.*, p. 148, t. 24, f. 12.—FISCHER *Cog. Viv.*, p. 373, t. 114, f. 1.

Not noted by Hutton. Reported from New Zealand on the authority of Quoy and Gaimard.

M. PIPERINA Philippi. Pl. 22, figs. 39, 40; pl. 35, figs. 4, 5.

Shell small, globose-conic, imperforate, thick, solid, blackish, speckled and maculated all over with yellowish, the body-whorl spirally encircled by two narrow bands of black articulated with orange; spire short, generally eroded more or less, apex acute or eroded; whorls 4 to 5, slightly convex, spirally finely striate, the striae often almost obsolete; aperture rounded, outer lip arcuate, acute, thickened within, the naere inside appearing finely lirate; columella short, oblique, not as wide as usual in this group, quite obviously bluntly toothed in the middle. Alt. 8, diam. $7\frac{1}{2}$ mill.

Fiji and Viti Is.

T. piperinus PHILIPPI, *Zeitschr. f. Mal.*, 1848, p. 111.—*Conchyl. Cab.*, p. 205, t. 30, f. 10.—FISCHER, *Cog. Viv.*, p. 260, t. 87, f. 3.—*T. amœnus* GOULD, *Proc. Bost. Soc. N. H.*, iii, p. 107, 1849.—*U. S. Expl. Exped. Moll.*, p. 187, t. 13, f. 218, 1852.

A globose-conic, solid little species, not likely to be confounded with any other, as the coloration, form and sculpture are very characteristic. Figs. 4, 5, of plate 35, are *T. amœnus* Gld.

Section CHLORODILOMA Pilsbry.

Latona HUTTON, *Linn. Soc. N. S. Wales*, ix, p. 368. (Not *Latona* Schumacher, *Essai*, p. 156 (1817).)

M. CRINITA Philippi. Pl. 22, figs. 41–44.

Shell globose-conic, narrowly perforate, solid, light cinereous, longitudinally marked with numerous narrow regularly spaced olive lines, the first whorls bright orange colored; spire conic, eroded; sutures linear, impressed; whorls 5, convex, spirally grooved, the grooves shallow, about 5 on the penultimate whorl; aperture oblique, the lip smooth and thickened within; columella not very thick, arcuate, white edged, obtusely dentate below; umbilico-columellar area bright green. Alt 17, diam. 16–18 mill.

Australian Coasts.

T. crinitus PHIL., *Zeitschr. f. Mal.*, 1848, p. 103.—*Conchyl. Cab.*, p. 235, t. 35, f. 9.—FISCHER, *Coq. Viv.*, p. 209, t. 69, f. 3.—*Trochocochlea mimetica* HUTTON, *Jour. de Conch.*, 1878, p. 32. (*Teste* JOHN BRAZIER, *Proc. Roy. Soc. Tasm.*, 1886, p. 200.)

The orange apex, green columella and narrow longitudinal lines characterize this species. It is sometimes imperforate.

M. ADELAIDÆ Philippi. Pl. 35, figs. 22, 23.

Differs from *M. crinita* only in lacking the tooth at the base of the columella; coloration, sculpture and form identical.

S. Australian and N. Tasmanian Coasts.

Trochus adelaidæ PHIL., *Conchyl. Cab.*, p. 140, t. 24, f. 1.—*Diloma australis* TENISON-WOODS, *Proc. Roy. Soc. Tasmania*, 1876, p. 145.—*Trochus (Diloma) adelaidæ* BRAZIER, *Proc. Roy. Soc. Tasm.*, 1886, p. 199.

M. ODONTIS Wood. Pl. 62, figs. 66, 67.

Shell globose-conic, more or less depressed, imperforate or very narrowly perforate; spirally finely striate, the striae becoming obsolete on the last whorl, incremental striae microscopic, sharp; apical whorls white, eroded; the remainder covered with a regular, elegant, minute reticulation formed by the intersection at right angles of two sets of obliquely descending black or bluish lines; body-whorl subangulate at the periphery; outer lip thin, acute, inside green, beautifully iridescent; columella arcuate, not dentate, pearly-edged; umbilico-columellar area vivid pea-green.

Alt. 15–20, diam. 18–20 mill.

Trochus odontis WOOD, *Ind. Test.*, suppl., t. 6, f. 37 (1828).—PHILIPPI, *Conchyl. Cab.*, p. 144, t. 24, f. 7.—FISCHER, *Coq. Viv.*, p. 313, t. 99, f. 1.—BRAZIER, *Proc. Roy. Soc. Tasm.*, 1886, p. 198.

The reticulated color-pattern will distinguish this species from the preceding.

M. ZEUS Fischer. Pl. 22, figs. 58-60.

Shell imperforate, thick, obtuse; apex short, papillose, yellowish; suture impressed; whorls 4 to 5, moderately convex, obliquely striate, spirally sulcate; last whorl ample, rounded, obsoletely angulated above, marginated at the suture, white, with radiating flexuous red lines; base convex; aperture circular, columella subdentate at base; columellar callous thick, whitish-green; outer lip thick. Alt. 16, diam. 19 mill. (*Fischer.*)

Habitat unknown.

Trochus zeus FISCHER, *Journ. de Conch.*, 1874; p. 372, et *Coq. Viv.*, p. 334, t. 104, f. 1.

I have not seen this species, which was described from several specimens of unknown origin, all of the same form and color-pattern. Dr. Fischer considers the green columella an indication that it is from Australia, where numbers of the Trochidae exhibit this character. The species seems to be more nearly allied to *M. crinita* Phil. and other species of *Chlorodiloma* than to typical *Monodonta*.

Section OXYSTELE Philippi.

Oxysteles PHIL., *Zeitschr. f. Mal.*, 1847, p. 19; *Handbuch der Conchyl.*, p. 210.—H. and A. AD., *Gen. Rec. Moll.*, p. 426.—FISCHER, *Manuel*, p. 820.—TRYON, *Struct. and Syst. Conch.*, ii, p. 314.

M. MERULA Lamarek. Pl. 23, fig. 79.

Shell rather depressed conoidal, imperforate, lusterless purplish-black; spire conical, apex eroded, yellowish, the following whorl spirally striate, the last two whorls smooth; whorls about 6, convex; sutures distinct; last whorl not carinated at the periphery, rather flattened on the base, and usually slightly eroded in front of the aperture; aperture large, oblique, the outer lip black-margined, within silvery, the nacre smooth, but apparently lirate; columella arcuate, thin, simple, white; umbilico-columellar region surrounded by a beautiful rose-colored tract. Alt. 27-40; diam. 35-41 mill.

Cape Region, S. Africa.

Trochus merula LAM., *An. s. Vert.*, vii, p. 16 (1822).—PHILIPPI, *Conchyl. Cab.*, p. 26, t. 6, f. 3, 4.—KRAUSS, *Die Südaf. Moll.*, p. 95.—FISCHER, *Coq. Viv. (Turbo)*, p. 182, t. 29, f. 1.—*Trochus sinensis* GMEL., *Syst. Nat.*, xiii, p. 3583.

M. TIGRINA Chemnitz. Pl. 23, figs. 61-64.

Shell conoidal, more or less elevated, imperforate, lusterless blackish or purplish, unicolored or with a few scattered white dots, or yellowish flexuous lines; spire conic, apical whorls eroded, yellow or whitish; whorls about 6, spirally coarsely but obsoletely lirate; aperture large, oblique, black-bordered, silvery within; columella simple, white or yellowish, bordered by a dull purplish streak; parietal wall usually covered by a thin silvery callous.

Alt. 27, diam. 32 mill.

Cape Region, S. Africa.

Trochus tigrinus CHEMNITZ, *Conchyl. Cab.*, v, p. 53, f. 1566.—PHILIPPI, *Conchyl. Cab.*, p. 27, t. 6, f. 5.—FISCHER, *Coq. Vie.*, p. 174, t. 58, f. 1.

In form like *M. merula*; but without the rosy base, more coarsely and obviously spirally lirate, and usually dotted with white.

Var. *VASCOI* Fischer. Pl. 23, figs. 62.

Shell with acute spire; deeply spirally sulcated, the penultimate whorl five-lirate; aperture less dilated. Alt. 33, diam. 31 mill.

M. SAUCIATA Koch. Pl. 24, figs. 95, 96; pl. 21, figs. 31, 32; pl. 62, figs. 81, 82.

Shell low-conical, imperforate, rather thin; ground-color greenish, especially on the last whorl, usually purplish on the spire, and either (1) spirally encircled by bands of dark green, black, or red oblong spots articulated with a lighter color, or (2) obscurely mottled with reddish, the ground-color covered with fine oblique or zigzag lines; the pattern sometimes so obscurely mottled, spirally and obliquely streaked, that it appears nearly uniform olivaceous, especially on the last whorl; spire more or less elevated, conic, the apex minute, acute, reddish, when not eroded; sutures well impressed; whorls 6, spirally more or less obviously, finely, irregularly striate or lirate; body-whorl rounded or subcarinated at the periphery; base somewhat convex, more or less impressed around the axis, sometimes eroded in front of the aperture; aperture large, very oblique; outer lip with a black-spotted green edge, which is generally followed by a broad thin opaque-white band, within which it is nacreous and iridescent; columella oblique, thin-edged, the edge convex in the middle; columellar area white, more or less eroded; umbilical tract covered by a thick pad of enamel. Alt. 20, diam. 24 mill.

Madeira; Mogador; N. Spain; Cape Verde Is.; Canary Is.

Trochus sauciatus KOCH in PHILIPPI, *Abbild.*, i, Trochus, t. 5, f. 7 (1845).—PHILIPPI, *Conchyl. Cab.*, p. 201, t. 30, f. 5.—*T. indecorus* PHILIPPI, *Conchyl. Cab.*, p. 143, t. 24, f. 5.—*T. listeri* WOOD, *Ind. Test. suppl.*, t. 5, f. 8 (no description).—*T. colubrinus* GOULD, *Proc. Bost. Soc. N. H.*, iii, p. 107 (1849) and *Expl. Exped. Shells*, p. 183, f. 223.—WATSON, *Challenger Moll.*, p. 65.—*T. sagittiferus* HIDAGO, *Mol. de Espana*, t. 60, f. 2-7 (not of Lamarck).—*T. citrinus* PHILIPPI, *Conchyl. Cab.*, p. 290, t. 42, f. 14.—FISCHER, *Coq. Viv.*, p. 262, t. 88, f. 1. (? *T. citrinus* Gmelin.)

Pl. 24, figs. 92, 93 represent the *T. indecorus*.

An extremely embarrassing species is the one under consideration, as Dr. Fischer truly remarks. Both Fischer and Watson have discussed at length its synonymy, each arriving at a different conclusion. I have been over this barren ground again—a task full of toil and difficulty,—and have been forced to adopt still another name for the shell. I am convinced that the *T. sauciatus* of Koch is identical with this species instead of with *T. sagittiferus* Lamarck. I will briefly rehearse the history of the above names: *T. citrinus* Gmel., 1788, is unidentifiable; *T. listeri* Wood, 1828, is probably this species, but the figure is poor and no description is given; *T. sauciatus* Koch (pl. 24, figs. 95, 96) corresponds perfectly with depressed specimens of this species; *T. colubrinus* Gould, is doubtless the same, but later in date. I cannot follow Fischer in uniting *T. indecorus* and *T. sauciatus* with *T. sagittiferus* Lam. The differences between these forms are indicated under the next species.

M. sauciata is like the Mediterranean *M. articulata*, *M. turbinata*, etc., in the convex columellar lobe; but agrees with the section *Oxysteles* in having a thin acute edge to the columella, and a thin shell. The coloration is excessively mutable, as well as the general form.

M. SAGITTIFERA Lamarck. Pl. 23, figs. 65-67; 76.

Shell conical, imperforate, rather thin; ground-color (usually) whitish, pinkish or bluish, painted with red, brown or blackish in innumerable patterns, but usually in one of the following modes: (1) longitudinal zigzag dark stripes on a light clear ground; (2) very obliquely descending narrow stripes or lines, generally zigzag or interrupted about the middle of the whorl; (3) narrow spiral articulated bands around the middle of the whorl, the base mottled or barred, and the suture bordered by a row of dark blotches; (4) ground-color pink or purplish, the entire surface variegated by rather

narrow spiral bands, finely articulated with red or purple and white; spire conical, elevated; sutures distinctly impressed; apex minute and acute when not eroded; whorls 6, convex, *quite smooth outside*, but when eroded the nacre is seen to be finely spirally lirate; base not eroded; aperture very oblique; outer lip narrowly margined, acute, iridescent within, the nacre smooth, but apparently lirate; columella *arcuate, concave*, white, thin, covering the place of the umbilicus with a pad of callous, the outer edge of which is usually *not appressed* closely to the base; parietal wall with a thin translucent callous or none; *umbilico-columellar callous bounded outside by a more or less obvious streak* of blue, green, brown, or sometimes light yellowish. Alt. 21, diam. 24; alt. 21, diam. 21 mill.

Cape Region of S. Africa.

Trochus sagittiferus LAM., *An. s. Vert.*, vii, p. 29.—PHILIPPI, *Conchyl. Cab.*, p. 150, t. 24, f. 16.—FISCHER, *Coq. Viv.*, p. 180, t. 59, f. 3, t. 103, f. 4 (excl. synonymy!).—*T. variegatus* ANTON, *Verzeich.*, p. 57.—PHILIPPI, *Conchyl. Cab.*, p. 144, t. 24, f. 6, 15.—*T. impervius* PHILIPPI, *Conchyl. Cab.*, p. 145, t. 24, f. 8.—*T. perdix* KOCH, in PHILIPPI, *Conchyl. Cab.*, p. 150, t. 24, f. 17.

Plate 24, fig. 94 is *T. variegatus* Anton; fig. 91 is *T. perdix* Koch; pl. 35, figs. 28–32 represent *T. impervius* Phil.

This form may be distinguished from the preceding by its *smooth, not striate nor lirate* surface; its columella is arcuate, concave or sometimes substraightened in the middle, but is never distinctly convex and lobed there as in *M. sauciata*; the outline of the shell is more compact and elevated, the aperture smaller, and the coloration, while sometimes approaching that of *M. sauciata*, is generally quite distinct.

M. FULGURATA Philippi. Pl. 35, fig. 16; pl. 23, figs. 68–70.

Shell imperforate, conoidal, rather thin, apex subacute; whorls 5½, moderately convex, nearly smooth, the upper ones eroded, spirally striate, yellow; the remainder margined and compressed at the sutures, greenish, ornamented with narrow brownish, obliquely radiating, zigzag lines; last whorl rounded, slightly descending; aperture subovate, sulcate within; columella arcuate, compressed; umbilical tract white, callous. Alt. 19, diam. 18 mill. (*Fischer*.)

Coast of Guinea.

T. fulguratus PHIL., *Zeitschr. f. Mal.*, 1848, p. 106 and *Conchyl. Cab.*, p. 268, t. 39, f. 10, 11.—FISCHER, *Coq. Viv.*, p. 181, t. 60, f. 1.

I have not seen this form. It is evidently closely allied to *M. sagittifera*, but according to Dr. Fischer, may be separated by its more elongated form, more acute spire, and close lines of color.

M. TENER Troschel. Pl. 35, figs. 17, 18.

This species nearly allied to *T. impervius* and *T. perdix*, but is apparently different; I count 5 whorls, the upper eroded; these are moderately convex, the last compressed or even concave below the suture, distinctly angular beneath, entirely smooth. The clear violet ground is so densely marked with oblique, narrow, blackish, longitudinal lines, that at a little distance the shell appears unicolored black. The aperture is very oblique; the greater part of the base is occupied by a very large porcellanous callous, which is concave in the middle and surrounded by a deep black zone. At the origin of the columella is a little pit. The columella is very oblique, flat, and is continued in a band parallel to the edge of the outer lip; the nacre is very beautiful, changing to violet.

Alt. 7, diam. 11 mill. (*Philippi*.)

Habitat unknown.

T. tener TROSCHER in PHILIPPI, *Conchyl. Cab.*, p. 141, t. 24, f. 2.

M. TABULARIS Krauss. Pl. 35, figs. 14, 15.

Shell small, conical, imperforate, rather solid; the coloration consists of rather broad longitudinal stripes of dark olive-green or red, alternating with stripes of bright pink, bordered with lines of delicate green, and frequently veined with the same tint; the stripes are continuous from suture to base, or are displaced or interrupted at the periphery; spire low-conic, apex eroded, *orange-colored*, the following whorl, if eroded, showing iridescent blue-green nacre, which is spirally grooved; whorls about 5, *smooth* when not eroded, the last obtusely subangulate at the periphery; base rather flattened, radiately striped with red and white, not eroded; aperture oblique, outer lip acute, edged with alternate green and white, smooth within; columella arcuate, thin, white, wide, covering the place of the umbilicus with an ivory-white pad, *which is closely appressed to the body-whorl*. Alt. 10, diam. 11 mill.

Cape of Good Hope.

Trochus tabularis KRAUSS, *Die Südaf. Moll.*, p. 97, t. 5, f. 30.—PHILIPPI, *Conchyl. Cab.*, p. 142, t. 24, f. 4.

The coloration of this species is peculiarly effective and delicate.

M. SUAVIS Philippi. Pl. 23, figs. 74, 75.

Shell small, conical, imperforate, rather solid but thin, pale olive or yellowish, with a broad spiral band of alternating crimson and white or greenish square blotches below the suture and another just above the periphery, the space between them occupied by several spiral bands of white or greenish, broken into squares by short vertical red lines, the base radiately marked with red lines; spire conical, apex acute, olive-colored when eroded through the white layer; sutures impressed; whorls 5, the last flattened beneath, smooth except on the base, where fine concentric lines are visible under a lens; aperture oblique, the lip thin, acute, brilliantly iridescent within, green predominating; columella arcuate, thin, obviously *toothed* near its junction with the axis above, and covering the place of the umbilicus with a white pad of callous; base concave around the axis. Alt. 12, diam. 14 mill.

New Caledonia; Japan.

Trochus suavis PHIL., Zeitschr. f. Mal., 1849, p. 191, and *Conchyl. Cab.*, p. 290, t. 43, f. 1.—FISCHER, *Journ. de Conch.*, 1875, p. 49, and *Coq. Viv.*, p. 312, t. 98, f. 4.—*Oxystele koeneni* DUNKER, *Ind. Moll. Mar. Jap.*, p. 142, t. 12, f. 4, 5, 6 (1882).

Somewhat similar to *M. tabularis* Krauss in size and form, but distinct in the columella, toothed above, caused by a semicircular groove which bounds the umbilical callous, the striate base, and the color-pattern.

Fischer gives the locality New Caledonia on the authority of BALANSA. Specimens before me from Japan were received from Prof. R. E. C. STEARNS. Dunker's *O. koeneni* seems to be identical. It is from Japan. See pl. 23, figs. 71, 72, 73.

Insufficiently described species of Monodonta.

"We would reject names accompanied by those short unmeaning Latin diagnoses, without giving distinctive characters or size of specimen, which authors are in the habit of publishing in the Proceedings of various Societies, if the same species is subsequently *figured* or *fully described* by other naturalists. The abuse which has arisen from the claims of priority based on these unrecognizable descriptions is certainly beyond endurance; and no author ought to be permitted to impose upon the scientific world a species characterized by half a dozen lines of conventional, mongrel Latin, that

would apply to several related species equally as well as to the one described. A positively recognizable description, or details of differences, or a figure of the species, should be rigidly required."—TRYON, in *Amer. Journ. Conch.*, i, p. 83.

M. CIRCUMCINCTA A. Adams. Testa ovato-conoidea, imperforata, lævi, nitida, crassa, cingulis rubris, albo viridi maculatis alternantibus picta; anfr. convexis; columella basi tuberculata, dente magno acuto terminata; labro duplicato, intus lirato. (*A. Ad.*)

Id. of Ticao, Philippines, on stones at low water. (Cuming.)

A. AD., P. Z. S., 1851, p. 175.

M. TUBERULATA A. Adams. Testa ovate-conoidea, imperforata, crassa, viridescenti, cingulis tuberculorum oblongorum violaceorum ornata; anfr. convexis; columella basi trituberculata, canali parallelo instructa, dente prominente acuto terminata; labro duplicato, intus lirato. (*A. Ad.*)

Habitat unknown.

A. AD., P. Z. S. 1851, p. 175.

M. RUGULOSA A. Adams. Testa ovato-conoidea, depressa, atrofusca, fasciis latis luteo-albis irregulariter picta, cingulis rotundatis interruptis ornata; columella basi bituberculata, canali parallelo instructa, dente magno acuto terminata; labro duplicata, intus lirato. (*A. Ad.*)

Habitat unknown.

A. AD., P. Z. S., 1851, p. 175.

M. EXIGUA A. Adams. Testa parva, conoidea, umbilicata, albida fusco variegata, cingulis transversis granulosis interstitiis longitudinaliter liris ornata; anfr. parum convexis, ultimo subangulato; umbilico recto, dente valido acuto terminata; labro intus sulcato. (*A. Ad.*)

Japan. (Siebold.)

A. AD., P. Z. S., 1851, p. 176.

May be a *Euchelus*, instead of a *Monodonta*.

M. SPILOTA A. Adams. Testa parva, ovato-depressa, conoidea, imperforata, lævi, nitida, viridi, maculis pallidis triangularibus; columella plana, alba, canali parallelo instructa, dente obtuso terminata; labro duplicato, intus lirato. (*A. Ad.*)

Habitat unknown.

A. AD., P. Z. S., 1851, p. 177.

LABIO RUDIS A. Adams. Testa orbiculato-conica, imperforata, spira obtusa, lutescente, lineis transversis nigris ornata, longitudinaliter oblique striata, transversim subexarata; labio complanato; columella antice subtuberculata; labro nigro luteoque intus marginato. (*A. Ad.*)

Australia.

A. AD., P. Z. S., 1851, p. 179.

LABIO CONCOLOR A. Adams. Testa turbinato-conica, imperforata; spira acuta, brunnea, longitudinaliter oblique striata, transversim sublirata; labio complanato, regione umbilicali impressa; columella arcuata, antice tuberculo terminata; labro nigro-fusco marginata. (*A. Ad.*)

New Zealand. (Hart.)

A. AD., P. Z. S., 1851, p. 180.

M. GLABRATUM Gould. Testa globoso-conic, crassa, polita, fusco-viridis, interdum ad verticem nigrescens et ad peripheriam pallidior, ubique sulcis 4-5 cineta, interspatiis tessellatim sulcata; anfr. 7, convexis; apertura ampla, rotundato-ovata, alba; labro intus sulcato; denti columellari acuto sulcato. Axis 15, diam. 13 mill. (*Gould.*)

China Seas.

Has a general resemblance to, and may be a variety of, *M. tuberculata*; but its rubbed look, tessellated rather than papillated surface, and shorter axis distinguish it. (*Gould.*)

GOULD, *Proc. Bost. Soc. N. H.*, viii, 1861, p. 20.

M. GRANULATA Gray.

Shell rather depressed, conical, purple variegated with white, generally concentrically wrinkled, and ornamented with granulated spiral ribs, the ribs of the upper part of the last and of all the other whorls rather distant, and forming four series; those of the under part rather closer and smaller; the axis umbilicated, smooth, the aperture roundish, the outer lips furrowed, the columellar lip smooth with a groove at its base.

Axis 4-12ths, diam. 5-12ths of an inch. (*Gray.*)

M. granulata GRAY, in Capt. King's *Survey of Intertropical and Western Coasts of Australia*, ii, p. 479 (1827).

M. DENTICULATA Gray.

Shell depressed, conical, pale reddish, ornamented with rows of white and brown spots, spirally grooved; ribs slightly granulated;

sutures distinct, impressed, the lower part of the last whorl nearly smooth, and the umbilicus white, smooth inside, the edge furnished with a series of granules; the mouth subquadrangular, outer lip crenulated at the edge, columellar lip smooth, with a large tooth at the inside and a little roughness on the outer side.

Axis 3-10ths, diam. 5-12ths of an inch. (*Gray.*)

M. denticulata GRAY, in Capt. King's *Survey of Intertropical and Western coasts of Australia*, ii, p. 479 (1827).

M. RUDIS Gray.

Shell ovate, conical, imperforated, rough, pearly, concentrically striated, whitish-brown; when worn or when eroded, purple; the whorls convex, suture distinct, sometimes occupying an impressed line on the lower whorl; the base rather convex, the aperture roundish, the axis (imperforate) covered with a white callous, which leaves a slight concavity over its end; the outer lip of three colors, the outer part purple or green and white, the middle pearly, and the inner opaque, white, and furrowed; the surface of the lower part of the last whorl is frequently worn away just opposite the mouth, so as to leave a purple spot. (*Gray.*)

M. rudis GRAY, in Capt. King's *Survey of Intertropical and Western Coasts of Australia*, ii, p. 480 (1827).

Genus CANTHARIDUS Montfort, 1810.

Cantharidus MONTF., *Conch. Syst.*, ii, p. 251 (1810).—H. & A. ADAMS, *Genera*, i, p. 423.—*Cantharis* FÉR.—*Elenchus* SWAINSON, *Treatise on Malacol.*, p. 351.—FISCHER, *Manuel de Conchyl.*, p. 819.

A genus restricted to Australasian seas, and hitherto found only in shallow water. The radula shows several peculiarities in the forms (*Cantharidus s. s.* and *Phasianotrochus*) which have been observed; showing, probably, more affinity to *Gibbula* than to any other genus. In *Cantharidus* (restricted) the central tooth has a body with broadly expanded supporting-wings, a narrowed peduncle or neck, which bears a simple cusp. This peduncle has on each side delicate wings, like those I have described for *Phasianella virgo*, and identical with those described and figured by Troschel for various species of *Gibbula*. The lateral teeth number five on each side; and they increase in size from the inner to the outer one; this peculiarity, together with that of the central tooth just described, will enable one

to recognize a radula of this genus at a glance. The inner lateral is slender, narrowed toward the cusp, like the centrals, and (sometimes at any rate) bearing a lamella behind the peduncle. The outer laterals are very broad, with one or several denticles on the cusp. *Phasianotrochus* (Elenchus of authors) has essentially the same arrangement, except that the centrals lack the peculiar wings to the peduncle (pl. 50, fig. 15, *C. badius* Wood). The radulæ of *Thalotia*, *Odontotrochus* and *Bankivia* are unknown. Watson says that *Leiopyrga* has the same dentition as *Margarita*, but this must be a mistake.

The genus should be grouped with *Gibbula* in a natural arrangement of the family. The only character separating *Cantharidus* from that genus is the *simple* cusp of the central tooth, whilst in *Gibbula* it is denticulate at the sides. I am wholly inclined to disregard the subfamily limits adopted in the first part of this work, (p. 6), and even more those used by Fischer (*Manuel*, p. 817). But I do not believe much improvement can be made until we have more knowledge of the soft parts of Trochidæ.

In conclusion, there is no character of importance at present known to me which will separate the small shining Australasian *Gibbula* (such as *picturata* Ad. & Ang., *nitida* Ad. & Ang., *fulminata* Hutton, etc.) from the smaller species of *Cantharidus*; and the resemblance between *Cantharidus* and *Calliostoma*, shown in the shells of certain species, is no evidence whatever of relationship—unless *Thalotia* and *Odontotrochus* prove to have a very different dentition from *Cantharidus*, in which event the genus will have to be dismembered.

The dentition of the following species has been figured by Prof. Hutton (Trans. N. Z. Institute, xv, xiv; 1881-'82). *Cantharidus purpuratus* Mart., *tenebrosus* Ad., *pupillus* Gld. These figures do not show as many teeth as is desirable. The only other radula figured is that of *C. badius* Wood, by Troschel (Das Gebiss, ii, t. xxiv, f. 4).

As to the nomenclature adopted, *Elenchus* of Swainson is a synonym of *Cantharidus* Montf. *Elenchus* of H. and A. Adams is the same as *Phasianotrochus* Fischer, but not *Elenchus* (Humph.) Swainson. I do not have access to the "Museum Calomnianum," a very rare work in which *Elenchus* was proposed by Humphrey; and do not know whether the genus was properly characterized or not. The name was unknown in conchological literature until Swainson

revived it in 1840 for *Trochus iris*. In this uncertainty I prefer to adopt *Cantharidus* of Montfort.

Subgenus CANTHARIDUS, Montfort.

Section *Cantharidus* Montf. (restricted).

C. IRIS Gmelin. Pl. 34, fig. 15.

Shell imperforate, elevated-conical, obtusely angular at the periphery, solid, but not very thick, whitish, tinged with blue on the body-whorl and yellowish or pinkish on the spire, all over closely longitudinally marked with undulating purplish-red streaks, often zigzag, or interrupted into spiral series of articulations; spire with slightly concave outlines, slender, more or less eroded and showing the iridescent green nacre at tip; sutures linear; whorls 8-9, generally showing traces of spiral impressed lines, base with about 5 spiral separated narrow ridges, often inconspicuous; aperture ovate-rhomboidal, oblique, lined with iridescent green nacre with red reflections; outer lip thin, slightly sulcate within; columella subvertical, generally straight in the middle or slightly projecting, pearly above; parietal wall eroded, brilliant green; umbilico-columellar patch whitish. Alt. 40, diam. 30, mill.

New Zealand.

Opalus MARTYN, Univ. Conch., t. 24.—*T. iris* GMEL. Syst. Nat., xiii, p. 3580.—LAM., An. s. Vert. vii, p. 27.—PHILIPPI, Conchyl. Cab., p. 9, t. 2, f. 7, 8; t. 46, f. 9.—WOODWARD, Manual of the Moll., t. 10, f. 8.—FISCHER, Coq. Viv., p. 157, t. 51, f. 4.—*Cantharidus iris* HUTTON, Man. N. Z. Moll., p. 99 (1880).

The largest species of the genus. Specimens with the outer coat ground off show a beautifully iridescent green nacre.

C. PRUININUS Gould. Pl. 46, figs. 60, 61.

Shell ovate-conical, imperforate, rather solid, deep purple (sometimes with a few white dots), apex pink; surface nearly smooth, very densely finely spirally striate all over; spire conical, apex subacute; whorls about 6, slightly convex, the last rounded or very obtusely angular; aperture less than one-half the length of shell, ovate, oblique, iridescent within and showing fine dense folds in the nacre; columella subhorizontal, straightened in the middle, expanded in a callous pad over the umbilicus.

Alt. 22, diam. 16 mill.; alt. 30, diam. 19 mill.; alt. 19, diam. 16 mill.

Auckland and Campbell Is.

T. capillaceus PHIL., Zeitschr. f. Mal., 1848, p. 102; *Conchyl. Cab.*, p. 275, t. 40, f. 7.—FISCHER, Coq. Viv., p. 161, t. 52, f. 3.—*T. episcopus* HOMBR. ET JACQ. Voy. au Pole-Sud, t. 14, f. 9–11.—KIENER, Species gen. Trochus, t. 52, f. 3.—*T. pruininus* GOULD, Otia, p. 55 (1846); U. S. Expl. Exped., t. 12, f. 203.—*Cantharidus Zealandicus* A. AD., P. Z. S., 1851, p. 169.—HUTTON, Manual N. Z. Moll., p. 99 (1880).—*C. pruininus* HUTTON, Proc. Linn. Soc. N. S. Wales, ix, p. 361 (1884).

The species exhibits considerable variation in the comparative length of the spire, but may be known from other species by the very fine close spiral striation of the outer surface and the dark purplish color.

Var. *PEROBTUSA* Pilsbry. Pl. 34, fig. 1.

Spire short, *very obtuse at apex*; whorls 5, the last large, descending anteriorly; aperture as long as spire; other characters as in *C. pruininus*. Alt. 20, diam. 19 mill.

C. *TENEBROSUS* A. Adams. Pl. 34, fig. 3.

Shell conical, elevated, imperforate, rather thick, solid, dark bluish-black, or with a purple shade; spire conoidal, sutures slightly impressed, apex somewhat obtuse, a trifle eroded and whitish at tip; whorls about 6, very slightly convex, those of the spire encircled by about seven liræ of about the same width as their interstices, body-whorl very bluntly subangular at periphery, with about 20 spiral liræ, and fine delicate growth-lines; aperture rounded-quadrate, oblique, less than $\frac{1}{2}$ the total length of shell; outer lip very narrowly black-edged, bordered by a series of short fine sulcations, beyond which there is a porcellaneous thickening; throat nacreous, iridescent, the reflections mainly green; columella subvertical, a trifle arcuate, rounded and pillar-like, covering the umbilicus above; parietal wall with a thin whitish callous; upper angle of aperture angular, slightly channeled. Alt. $11\frac{1}{2}$, diam. $9\frac{1}{2}$ mill.

New Zealand.

C. tenebrosus A. AD., P. Z. S., 1851, p. 170, no. 11.—HUTTON, Manual N. Z. Moll., 1880, p. 101; Proc. Linn. Soc. N. S. Wales, ix (1884) p. 361.

Narrower and more coarsely sulcated than *C. huttoni*.

Var. *HUTTONII* Smith. Pl. 34, fig. 2.

Shell short-conical, covered perforate, bluish-black or purplish-black, the apex worn white; whorls 5 to 6, slightly convex, sculpt-

ured by 7 to 8 spiral striæ and incremental lines; last whorl obtusely angular at the periphery, rather convex beneath, slightly impressed in the region of the umbilicus; aperture subcircular-quadrate iridescent within, lightly grooved; lip within a trifle thickened whitish, narrowly edged with black; columella slightly arcuate, thickened, covering the perforation.

Alt. $14\frac{1}{2}$, diam. $10\frac{1}{2}$ mill.; alt. 9, diam. 7 mill. (Smith.)

New Zealand.

T. (Cantharidus) Huttonii E. A. SMITH, Journ. Linn. Soc. London, xii (Zoology), p. 558, t. 30, f. 20 (1876).—HUTTON, Manual N. Z. Moll., 1880, p. 100.—*Gibbula plumbea* HUTTON, Journ. de Conchyl., 1878, p. 33 (teste Hutton, Manual N. Z. Moll., p. 100).—*Cantharidus tenebrosus* Ad. var., HUTTON, Proc. Linn. Soc. N. S. Wales, ix (1884), p. 362; Trans. N. Z. Inst., xiv, t. 7, f. L. (Dentition.)

Care must be taken not to confound this species with one or two others which are found from the same locality. *C. tenebrosus*, described by A. Adams is a narrower and more coarsely sulcated species than the present; and a second species (at present undescribed) is closely allied; it is umbilicated more broadly, spirally sulcated, and not so dark in color, being of a pale purplish tint with the spiral liræ between the sulcations of a darker tint. (Smith.)

C. PURPURATUS Martyn. Pl. 45, fig. 44.

Shell imperforate, acutely conical; whorls 8, somewhat convex, separated by slightly impressed sutures, the first reddish-green, the remainder whitish, ornamented with rosy oblique streaks, spirally cingulate, cinguli flat, 5 on the penultimate whorl, the interstices narrow, obliquely lamellose-striate; last whorl subangular, convex beneath, concentrically liræ, articulated with white and purplish; aperture subtrapezoidal, sulcate within; lip thin; columella nearly vertical, columellar callous thin, narrow.

Alt. 22, diam. 16 mill. (Fischer.)

Auckland to Bank's Peninsula, N. Z.

Limax purpuratus MARTYN, Univ. Conch., t. 68 (1784).—*Trochus purpuratus* DESH. in Lam., An. s. Vert. ed. 2, ix, p. 108.—PHILIPPI, Conchyl. Cab., p. 10, t. 2, f. 9, 10.—FISCHER, Coq. Viv., p. 366, t. 112, f. 3.—*Cantharidus purpuratus* HUTTON, Proc. Linn. Soc. N. S. Wales, ix, p. 361; Trans. N. Z. Inst., xv, t. 14, f. o (dentition).—*T. rostratus* GMELIN, Syst. Nat., xiii, p. 3580.—*T. elegans* GMEL. l. c., p. 3581.—(*Phas. rubella* Menke, Synops. Moll. teste Hutton.)—*T. texturatus* GOULD, Proc. Bost. Soc. N. H., iii, p. 90 (1849);

U. S. Expl. Exped. Moll., p. 181, t. 12, f. 206.—FISCHER, Coq. Viv., p. 133, t. 46, f. 1.—*T. pallidus* HOMBR. ET JACQ. Voy. au Pole-Sud, p. 55, t. 14, f. 12, 13. (Not *T. pallidus* Forbes).—*T. rostratus* KIENER, Species et Icon., t. 46, f. 1.—*T. torosus* QUOY, *miss.* in KIENER, Species et Icon., genre Trochus, t. 46, f. 3.—FISCHER, Coq. Viv., p. 136, t. 46, f. 3.

I am disposed to refer to one species all of the coarsely ribbed *Cantharidus* of New Zealand included in the above synonymy. The description given above applies to the typical *purpuratus*. The following may be separated as varieties.

Var. *TEXTURATUS* Gould. Pl. 45, figs. 41–43.

Form as in typical *C. purpuratus*. The sculpture consists of five broad rounded spiral ribs on the penultimate, nine or ten on the last whorl. The ribs have a secondary sculpture of *fine spiral striae*, the whole surface covered by sharp incremental striae which are lamellose in the narrow interstices between ribs. Aperture brilliantly nacreous within. Color whitish, longitudinally striped with red or purplish; apical whorls roseate.

Var. *TOROSUS* Quoy. Pl. 45, fig. 45.

Imperforate, elongate-conical, spire acute; whorls 7 to 8, livid-reddish or ashy, slightly convex, radiately irregularly striate, with 4 low, transversely striated spiral cinguli; body-whorl subearinate; base convex, 4-lirate; aperture ovate; columella white, arcuate, margins greenish. Alt. 26, diam. 15 mill. (*Fischer*.)

Nothing more than an elongated form of the preceding, scarcely distinct enough for varietal rank. Specimens before me are intermediate between *texturatus* and *torosus* in form and coloration.

C. *PULCHERRIMUS* Wood. Pl. 46, figs. 78, 79.

Shell imperforate, acutely conical, elongated, thick and solid; spire straightly conical, apex subacute, sutures linear; whorls about 6, nearly flat, the penultimate with four or five broad flat spiral ribs, often unequal in width, separated by narrow impressed grooves, the body-whorl subangular, with four or five broad flat low ribs above the periphery and more numerous narrower ones on the base. The ribs are usually purplish-crimson articulated with narrow white marks. Aperture small, less than one-half the length of shell, oblique, oval, brilliantly iridescent and somewhat sulcated inside, *peristome edged with a line of intense crimson*, bordered with green-

ish inside; columella vertical, slightly arcuate, straight in the middle; parietal wall covered by a light callous.

Alt. 14–17, diam. 9–11 mill.

Southern Australia; Northern Tasmania.

T. pulcherrimus WOOD, Ind. Test. suppl., t. 6, f. 45.—PHILIPPI, Abbild. u. Besch., ii, Trochus t. 7, f. 1; Conchyl. Cab., p. 132, t. 23, f. 4, t. 43, f. 11.—FISCHER, Coq. Viv., p. 137, t. 46, f. 4.—*T. preissii* MKE., Moll. Nov. Holl. Sp., p. 17.—*T. puella* PHIL., Zeitschr. f. Mal., 1851; Conchyl. Cab., p. 327, t. 46, f. 12.—*Thalotia mariae* TENISON-WOODS, Proc. Roy. Soc. Victoria, xiv, p. 58 (1871).

Separated from *C. purpuratus* by the smaller size, thicker shell, coarser, more unequal ribs and crimson peristome; from *C. lesueuri* by the much coarser sculpture.

C. LESUEURI Fischer. Pl. 45, figs. 52–54; pl. 34, figs. 9, 10.

Shell imperforate, elongated conical, somewhat solid, whitish or a little tinged with olive, painted with numerous rather narrow longitudinal olive-brown or reddish-brown stripes generally broken into tessellations on the base; spire long, apex subacute, whitish; sutures moderately impressed; whorls about 7, flat or concave below the sutures, convex and swollen at the periphery and above each suture, encircled by numerous fine liræ; last whorl a trifle deflexed at aperture, often subangular at the periphery; aperture rhomboidal, less than half the total length of shell; peristome rather thin, acute, edged by a row of red dots, thickened a little distance within, the thickening finely crenulated; columella vertical, marked with crimson at the outer base. Alt. 13–19, diam. 10–11 mill.

S. Australian Coasts; Tasmania.

T. lesueuri FISCHER, Coq. Viv., p. 129, t. 45, f. 2.—BRAZIER, Proc. Roy. Soc. Tasm., 1886, p. 194.—*Phasianella elegans* LAM., An. s. Vert., iii, p. 53 (1822).—*Trochus elegans*, KIENER, Spec. et Icon. Coq. Viv., t. 45, f. 2 (not *T. elegans* Gmel.).—*T. lehmanni* MKE., Moll. Nov. Holl., p. 18 (1843).—PHILIPPI, Abbild. u. Beschreibung., ii, Trochus t. 7, f. 2 (not *T. lehmanni* KIENER).—*T. pictus* PHILIPPI, Conchyl. Cab., p. 139, t. 23, f. 18, 19.—*Thalotia picta* ANGAS, P. Z. S., p. 179 (1865). (Not *T. pictus* Wood.)

This species is characterized by its fine spiral striation, whorls swollen at the periphery, and more or less red-edged peristome. In some specimens the longitudinal color streaks are quite broad; the base is almost always finely tessellated, and the lower part of the

columella is crimson. There is an umbilical tract of tessellated pink and white.

The following form does not seem to me to differ specifically, although its color-pattern of whitish flames on a coral-red ground give typical examples quite a distinct aspect.

Var RAMBURI Crosse. Pl. 45, fig. 40.

Shell imperforate, pointed conical, solid, crimson with narrow radiating whitish flames on the upper surface, usually extending to the periphery, and an umbilical tract of red and white tessellated; spire lengthened, apex subacute, sutures subimpressed; whorls about 7, concave below the sutures, convex and swollen at the periphery and on the lower edge of each whorl of the spire; whole surface finely spirally lirate, the lirate about as wide as the interstices, which are delicately obliquely striate; aperture oval-quadrate, iridescent within, less than half the length of shell; peristome edged by a row of crimson dots, with a porcellanous internal thickening which is finely crenulate; columella vertical, slightly arcuate, pearly.

Alt. 13, diam. 8; alt. 18, diam. 12 mill.

S. Australian Coasts.

T. ramburi CROSSE, Journ. de Conchyl., 1864, p. 342, t. 13, f. 3.—FISCHER, Coq. Viv., p. 409, t. 120, f. 3.—*T. pulcherrimus* Wood, var. PHILIPPI, Conchyl. Cab., p. 295, t. 43, f. 11.

Typically of a coral-red or crimson color, flammulate above with whitish. Fully adult examples often show the light flames only upon the upper whorls.

C. EROGATUS Fischer. Pl. 46, fig. 69.

Shell conic-elongate, spire acute; whorls 7–8, the first eroded, iridescent, the rest planulate, submarginate below, smooth, encircled by 3–4 slightly impressed lines, ornamented with minute dots arranged into radiating flames; last whorl carinated, concentrically striate beneath; aperture rhomboidal, columella subtruncate below.

Alt. 19, diam. 14 mill. (*Fischer.*)

Australia?

T. erogatus FISCHER, Coq. Viv., p. 128, t. 45, f. 1.—*T. indistinctus* KIENER, Species, etc., t. 45, f. 1. (Not *T. indistinctus* Wood, Ind. Test., suppl., t. 6, f. 41.)—PHILIPPI, Conchyl. Cab., p. 293, t. 43, f. 7.—*Ziziphinus indistinctus* REEVE, Conch. Icon. f. 35. ?

Dr. Fischer, from whom my information concerning this species is derived, says: I have not seen this species. It is not in the collection of the Museum.

M. Kiener has indentified this shell with *Trochus indistinctus* Wood. It differs from the type of Wood by the more conical form, fewer and shallower concentric grooves. There is at the Museum a series of Trochids collected by Péron and Lesueur on the Australian coast, which represent exactly the figure of Wood. Their spiral liræ are salient and subgranose; the whorls of the spire project at the lower part. The figure of Philippi cited approaches that of Kiener; its whorls are smooth, the grooves shallow. The coloration of the umbilical region is a little different. Reeve's figure seems to belong to another species; it is narrower, less carinated, and the inter-liral spaces are striated. In conclusion, the *T. indistinctus* of Kiener and of Philippi seems to us to be a species different from that of Wood, and we propose to name it *T. erogatus*. (*Fischer.*)

C. INDISTINCTUS Wood. Pl. 34, fig. 4.

This form is known to me only by the remarks of Fischer (*supra*, under *T. erogatus*) and the figure in the Index Testaceologicus, pl. 6, fig. 41. The latter is copied on my plate. It is said to be from Australia.

C. GILBERTI Montrouzier. Pl. 45, figs. 37, 38.

Shell imperforate, conic-elongate, acute; whorls 10–11, planulate, greenish, with a few whitish radiating flexuous irregular streaks, or punctulate with white, obliquely very finely striate, spirally lirate, the liræ delicate, 15 to 16 on the penultimate whorl, the two lower ones wide, prominent; last whorl carinated, somewhat depressed above, convex beneath and 10-lirate, sometimes with intercalated lirule. Aperture subquadrate, lip simple, greenish, basal margin arcuate; columella straight, short, with a parallel groove outside, base truncate. Alt. 13, diam. $7\frac{1}{2}$ mill. (*Fischer.*)

Island of Art, N. Caledonian Archipelago.

T. gilberti MONTR., in Fischer, Journ. de Conchyl., 1878, p. 207.
—*T. gilberti* FISCHER, Coq. Viv., p. 401, t. 119, f. 2.

A species allied to *T. fourrieri* Crosse, differing in the larger size, more numerous whorls, more salient spiral liræ and more carinated body-whorl. The two lower liræ of each whorl form a strong carina. The truncation of the base of the columella is very distinct, while it is slight or wholly wanting in *T. fourrieri*. M. Souverbie informs me that it was by an error that this species was named *gilberti*; it should be called *gilberti*. (*Fischer.*)

C. ARTENSIS Fischer.

Shell imperforate, thick, conico-elongated, apex reddish, eroded, remaining whorls 6, spirally lirate, penultimate whorl with 6 granose liræ, the first and last largest, 6th or basal ridge very prominent subcarinate, interstices obliquely striate, decussated on the last whorl; upper whorls whitish-rosy, penultimate radiately streaked with white and red, last whorl olivaceous, obscurely clouded, carinated; base convex, ornamented with 7 concentric liræ, punctate with rosy, and with intermediate lirulæ; aperture subquadrate, basal margin arcuate; columella straight, bounded outside by a parallel groove, truncate at base. Alt. 11, diam. 8 mill. (Fischer.)

Is. Art, New Caledonian Archipelago.

T. artensis FISCHER, Journ. de Conchyl., 1878, p. 208.

This species, represented by one slightly worn example, belongs to the same group as the preceding [*T. giliberti*]. It is heavier; its base is wider; the surface of the whorls has granulose liræ, and the oblique striæ, very prominent on the last whorl. The coloration is peculiar. It is probable that this diagnosis will require modification when better preserved specimens are found. (Fischer.)

The single specimen known is in the Bordeaux Museum.

C. FOURNIERI Crosse. Pl. 45, fig. 51.

Shell imperforate, acutely elongate-conical, small, brown or olivaceous, unicolored or punctate or maculate with white; spire straightly conical, apex acute, sutures linear; whorls about 8, flat, very finely, evenly, densely spirally striate, the striæ sometimes sub-decussated by delicate oblique growth-lines; last whorl carinate at periphery, the base coarsely lirate, liræ about 9 in number; aperture small, quadrangular, smooth within; lip acute, bordered inside by a wide porcellaneous band, the throat nacreous, brilliant green; columella straight, scarcely truncate at base.

Alt. 9, diam. 6; alt. 7, diam. 4½ mill.

Id. of Nou, N. Caledonian Archipelago.

T. fournieri CROSSE, Journ. de Conchyl., 1863, p. 180.—FISCHER, *loc. cit.*, 1875, p. 49; Coq. Viv., p. 400, t. 119, f. 1.

Seems to be very closely allied to *C. giliberti*. The figure of this species is not very satisfactory.



C. SUAREZENSIS Fischer. Pl. 45, fig. 55.

Shell narrowly perforate, conic-acute; whorls 9 to 10, planulate, the embryonic smooth, buff, the remaining whitish-buff, ornamented with longitudinal wavy streaks of brown or rosy, and sometimes spiral zones; spirally lirate, liræ 7 on the penultimate whorl, upper and lower ones most prominent, the intermediate 5 slightly granose, the interstices sharply obliquely striate; last whorl angular, convex beneath, with about 8 concentric liræ. Aperture subquadrate, lip acute, columella subtruncate; parietal wall bearing a callous in adults. Alt. 18, diam. 13 mill.

Id. Nossi-Bé; and Diego-Suarez, Madagascar.

T. suarezensis FISCHER, Journ. de Conchyl., 1878, p. 63; Coq. Viv., p. 378. t. 115, f. 2.

A well-marked form, distinct in possessing a narrow umbilicus, and distinctly granose liræ.

C. HILARIS Lischke. Pl. 45, fig. 39.

Shell subrimate, cylindrical-conic, smooth, shining; whorls 8 the first eroded, greenish; the remainder scarcely convex, red and white clouded, maculate with brown above, encircled by equidistant olive-brown lines; last whorl angular, convex beneath and ornamented with 6 concentric lines; aperture subquadrate, smooth within; basal margin scarcely arcuate; columella narrow, subtruncate beneath, whitish-green. Alt. 14, diam. 7 mill. (*Fischer.*)

Nagasaki, Japan.

T. hilaris LISCHKE, Malak. Bl., 1871, p. 41; Jap. Meeres-Conchyl., 2d part, p. 85, t. 5, f. 14, 15.—FISCHER, Coq. Viv., p. 353, t. 110, f. 2.

It is possible that *Ziziphinus japonicus* A. Ad. is identical.

Fischer says: This species is quite remarkable in its very elongated form, like a *Bankivia*. Lischke's type was not adult; it is more conical and smaller than the specimen figured by me, attaining only 8½ mill.

C. PUPILLUS Hutton.

Shell depressed or sometimes elevated, imperforate or narrowly perforated; whorls spirally ribbed. Dark brown or greenish-brown, with brown and reddish markings; margin of the aperture greenish-

brown. A very variable shell, smaller than *C. tenebrosus*. (*Hutton.*)

Bank's Peninsula to Dunedin, N. Zealand.

Cantharidus pupillus HUTTON, Proc. Linn. Soc. N. S. Wales, ix, p. 562, 1884, etc. (not *Trochus pupillus* Gould, U. S. Expl. Exped. xii, p. 186, atlas, fig. 208).

My knowledge of this shell is derived wholly from Professor Hutton's description and remarks. It is not the *T. pupillus* of Gould, which is undoubtedly a species from the West coast of North America.

C. SANGUINEUS Gray. Pl. 47, figs. 92, 93.

Shell top-shaped, white, with rows of numerous blood-red spots; whorls flattened, the last obscurely keeled; the front rather convex, with sharp-edged, low spiral ridges. (*Gray.*)

Auckland to Wellington, N. Z.; Chatham Is.

Troch. (Gibbium) sanguineus GRAY, Dieffenbach's Travels in New Zealand, ii, p. 238 (1843).—*T. sanguineus* E. A. SMITH, Zool. Voy. H. M. S. Erebus & Terror, ii, Mollusca, p. 4, t. 1, f. 12 (1875).—*Cantharidus sanguineus* HUTTON, Proc. Linn. Soc. N. S. Wales, ix, p. 362 (1884); and var. *cælatus* HUTTON, l. c., p. 363.

Hutton says of this species, which I have not seen. Shell imperforate, spirally grooved. Pinkish white, with red spots on the ribs, or with red flexuous longitudinal markings; interior and mouth white.

Var. *CÆLATUS* Hutton.

Smaller but more deeply ribbed and the grooves wider. (*Hutton.*)

Foveaux Straits.

Section PHASIANOTROCHIUS Fischer, 1885.

Phasianotrochus Fischer, Manuel de Conchyl. p. 819.—*Elenchus* H. & A. Ad., Gen. Rec. Moll. i, p. 424 (not *Elenchus* Swainson).

C. BADIUS Wood. Pl. 45, figs. 57, 58.

Shell imperforate, elongated-conical, solid, rather thick, polished, shining; color brown, fawn-color or rosy, with widely-spaced light or dark narrow spiral lines, usually four in number on the penultimate whorl; surface microscopically spirally densely striate; spire slender, straight-sided; apex acute; whorls 7, a little convex, the last rounded at the periphery; aperture slightly exceeding one-third

the total length, ovate, brilliantly iridescent within, and sulcate; peristome thickened, greenish; columella vertical, toothed below the middle. Alt. 28, diam. 13 mill.

S. Australian Coasts.

T. badius WOOD, Index Test., suppl., t. 6, f. 46.—PHILIPPI, Conchyl. Cab., p. 137, t. 23, f. 14.—FISCHER, Coq. Viv., p. 151, t. 50, f. 2, 3.—*T. lividus* KIENER, Species et Icon., t. 50, f. 2 (not *T. lividus* Phil.).—*Monodonta rosea* LAM. An. s. Vert., vii, p. —DELESSERT, Rec. de Coq., t. 37, f. 3.—*T. roseus* PHIL. Conchyl. Cab., p. 134, t. 23, f. 7.—KIENER, Species et Icon. t. 50, f. 3.—CHENU, Manuel, ii, p. 360, f. 2672. (not *T. roseus* Gmel.)—*T. australis* QUOY ET GAIMARD, Voy. de l'Astrolabe, iii, p. 328, t. 63, f. 13, 14. (not *T. australis* Broderip, 1830, nor *Monodonta australis* Lam.)—*T. quoyi* PHILIPPI, Conchyl. Cab., p. 139, t. 23, f. 17.—*T. picifer* FISCHER, Coq. Viv., genre Turbo, p. 111.

This species is separated from the following by the plain coloration, *without longitudinal markings*. It frequently attains much greater size than the measurements given above indicate; Kiener's "*T. lividus*" measuring 38 mill. in length.

C. PERONI Philippi. Pl. 34, figs. 12–14.

Shell imperforate elongate-conic, pointed, exactly like *C. badius* in contour; polished, purplish-pink, darker toward the apex, *with longitudinal zigzag or flexuous white lines or stripes*. Aperture as in *C. badius*. Alt. 30, diam. 14 mill.

S. Australian Coasts.

T. peronii PHILIPPI, Conchyl. Cab., p. 135, t. 23, f. 9.—FISCHER, Coq. Viv., p. 153, t. 50, f. 1, 4; t. 51, f. 3.—*Monodonta lineata* LAM. An. s. Vert., vii, p. 38 (not *T. lineatus* Da Costa nor Lam.)—*T. vermiculosus* KIENER, Species et Icon., t. 50, f. 4, t. 51, f. 3.—*T. fulmineus* KIENER, loc. cit., t. 50, f. 1.

Exactly like *C. badius* in form and texture, but differing in the longitudinal white lines. *T. fulmineus* Kiener, is founded on a specimen with very numerous oblique lines (fig. 12). The name *lineatus* of Lamarek has priority for this species, and is not preoccupied in *Cantharidus*. I follow Fischer in retaining Philippi's name, however, as there is a *lineatus* in both *Monodonta* and *Trochus* s. s., both bearing date anterior to the present species.

C. bellulus (Dkr.) Philippi. Pl. 34, fig. 5.

Shell imperforate, elongate-conic, acute, solid, polished, grayish or pinkish, with a few spiral orange lines, two on the penultimate whorl; the spaces between these lines marked with short white curved lines in pairs, often forming a figure 8 shaped pattern. Whorls about 8, nearly flat, the last rounded at the periphery; spire attenuated toward the acute purplish apex; aperture small, contracted, sulcate and iridescent within; columella vertical, strongly toothed below. Alt. 15, diam. 7 mill.

S. Australian Coasts.

T. bellulus DUNKER in PHILIPPI, Abbild. u. Besch., ii, Trochus t. 7, f. 6.—PHILIPPI, Conchyl. Cab., p. 134, t. 23, f. 8.—FISCHER, Coq. Viv., p. 154, t. 51, f. 1.

A very attractive little species. The color-pattern is quite constant and characteristic. The interior of the mouth is more coarsely sulcate than in other species, showing only about 6 folds; the outer and basal lips have a slight submarginal porcellaneous subdentate thickening, which stops a little space short of the upper termination of the outer lip.

C. irisodontes Quoy et Gaim. Pl. 46, figs. 64–66.

Shell imperforate, elongate-conic, pointed, solid, polished, yellowish, pink, or olive-green, with reddish or olive longitudinal lines in pairs, sometimes separate on the last whorl, and usually with numerous narrow, rather obscure spiral pink or yellowish lines; sometimes with a few series of white dots on the upper part; spire conic, shorter, less attenuated than in *C. bellulus*; whorls about 7, scarcely convex, the last not carinate, finely striate beneath, smooth above; aperture rather large, often expanded smooth inside, lined with intensely green nacre; columella strongly toothed below.

Alt. 15, diam. 8 mill.

S. Australian Coasts.

T. irisodontes QUOY et GAIMARD, Voy. de l'Astrol., iii, p. 246, t. 63, f. 7–12.—*T. iriodon* PHILIPPI, Abbild. u. Beschreib., ii, Trochus t. 7, f. 4, 5, 8; Conchyl. Cab., p. 136, t. 23, f. 10, 11, 13, t. 43, f. 8.—FISCHER, Coq. Viv., p. 160, t. 52, f. 3.—*T. latus* PHIL., Conchyl. Cab., p. 133, t. 25, f. 6.—*Monodonta virgata* MKE. Moll. Nov. Holl. spec., p. 15.—*T. virgulatus* PHIL., Conchyl. Cab., p. 136, t. 23, f. 12.—*T. minor* TROSCHEL (in Mus. Berol.) PHILIPPI, Conchyl. Cab., p. 137, t. 23, f. 15.

The coloration is quite variable, but usually is as described above. Unicolored green specimens are before me. The aperture is sometimes so dilated that the spire seems to lean to that side. I have not followed Philippi and Fischer in emending Quoy's irregularly formed name. By error, fig. 66 of this species was grouped on the plate with *C. woodsi*anus.

C. APICINUS Menke. Pl. 34, fig. 6, 7.

Shell imperforate, elongated, solid, smooth, shining, grayish, or brownish-yellow, with numerous narrow obliquely longitudinal red lines; whole surface microscopically spirally striate, the striae coarser on the base; whorls 8 to 9, nearly flat, upper whorls pink; spire turritid, straight sided, acute; sutures linear, sometimes white-margined; body-whorl rounded at the periphery; aperture slightly exceeding one-third the total length of shell, oval, beautifully iridescent within, smooth, not sulcate; columella with a subacute tooth below the middle. Alt. 18, diam. 9 mill.

W. Coast Australia (Preiss).

Monodonta apicina MENKE, Spec. Moll. Nov. Holl., p. 15 (1843)
—*T. apicinus* PHIL., Conchyl. Cab., p. 133, t. 23, f. 5.

This species is more slender than any other Phasianotrochus known to me. It is allied to *C. iridodon*, but the coloration is different from any form of that species, consisting of very numerous narrow obliquely-descending red lines.

Figure 6 is copied from Philippi. I have added that of a specimen which seems to belong to this species.

Philippi's remarks are as follows: Of all the shells I know, this Trochid has the most brilliant luster. I count 11 to 12 whorls, which are completely flat on the specimens before me, although on those described by Menke they were somewhat convex below, contracted above; under a lens there is seen a very finely, densely striate epidermis; these spiral striae are more distinct on the base. The color is brownish-yellow, with numerous fine, crowded, oblique rust-brown longitudinal lines, often hard to perceive on account of the golden and violet iridescence, the centrum whitish.

Alt. 22, diam. 9 mill.

C. LEUCOSTIGMA Menke. Pl. 46, figs. 82, 83.

Shell imperforate, slender, elongated-conical, solid, polished, fawn-colored, darker at apex, marked with radiating pure white or pink blotches or sparsely scattered spots; all over microscopically spirally

striate and with distant superficial linear sulci, 4 to 6 in number on the penultimate whorl; whorls about 7, a trifle convex, the last rounded or subangulated at periphery; aperture ovate, angular above, broadly rounded beneath, iridescent and sulcate within, columella arcuate, dentate below.

Alt. 23, diam. 11 mill.; alt. 14, diam. 7 mill.

S. Australia.

T. leucostigma MKE. in PHILIPPI, Abbild. u. Beschreib. ii, Trochus t. 7, f. 7.—PHIL., Conchyl. Cab., p. 138, t. 23, f. 16.—FISCHER, Coq. Viv., p. 158, t. 52, f. 1.—*T. leucostigmus* KIENER, Spec. et Icon. genre Troque, t. 52, f. 1.—*T. gracilis* ANTON in PHILIPPI, Conchyl. Cab., p. 140, t. 23, f. 20.—FISCHER, Coq. Viv., p. 156, t. 51, f. 2.—*T. nitidus* KIENER, Species et Icon., t. 51, f. 2 (not described).

Var. GRACILIS Anton. Pl. 45, fig. 50.

Small, slender, like *C. leucostigma*, but lacking white markings on the spire. Alt. 17, diam. 7 mill. or smaller.

As Fischer remarks, this variety is like a miniature *C. badius* in coloration.

C. NITENS Kiener. Pl. 46, fig. 77.

Shell imperforate, conic-pyramidal, elongated, acute, whorls 7 to 8, shining, buff or ashen, elegantly variegated with minute spots of violet and white; embryonic whorls smooth, the following planulate, sometimes prominent and dilated above the sutures, encircled by about 6 liræ, the interstices striated; last whorl carinated, encircled by a larger rib at the margin, slightly convex beneath, and ornamented with 8 beautifully red-spotted concentric liræ; columellar area margined with reddish-violet. Aperture rhomboidal; columella white, arcuate, dentate at base. Alt. 15, diam. 11 mill. (*Fischer.*)

Australian Coast; Kangaroo Id.

T. nitens, KIENER, Species et Icon., t. 45, f. 4.—FISCHER, Coq. Viv., p. 132, t. 45, f. 4.—*T. lepidus* KOCH in PHILIPPI, Conchyl. Cab., p. 84, t. 15, f. 4. (?)

This species is remarkable in its polished shell, elegantly variegated with red, violet and white, and the deep red color of the base and columella. It was discovered by Péron and Lesueur, naturalists of Captain Baudin's expedition to Southern lands. The individual figured by Kiener is a little adnormal; its whorls project too much

above the sutures. Generally the whorls of the spire are flat. (*Fischer.*)

C. RUTILUS A. Adams. Pl. 34, fig. 8.

Shell imperforate, conical, solid, shining, fawn-colored or light yellowish-olive, with numerous narrow oblique flexuous reddish longitudinal lines; the upper whorls of the spire more or less marked with white and pink or olive spots arranged spirally; spire conic, straight sided; apex acute, white or buff; sutures linear, becoming a trifle impressed around the last whorl; whorls about 7, planulate, densely spirally striate, the striæ stronger on the base; penultimate whorl a trifle projecting above the suture; body-whorl obtusely subangular at periphery; aperture triangular-ovate, outer lip arcuate above, green-marginate just within the edge, this rim followed by a band of opaque white which is deposited thin, is not more than $1\frac{1}{2}$ mill. broad, and does not extend to the upper angle of aperture; within this the mouth is very brilliantly iridescent, green. The columella is vertical, pearly, ending in an acute, compressed denticle. The parietal wall has a thin deposit of brilliantly iridescent Prussian blue nacre. Alt. 17, diam. $10\frac{1}{2}$ mill.

Australia.

Eleuchus rutilus A. AD. P. Z. S., 1851, p. 171.

This form is allied to *C. apicinus* Mke.; resembling that species in the numerous reddish oblique lines. The upper whorls have a different color-pattern however, and the species is much less elevated, more conical. The aperture has a more triangular contour than any other species, although some forms of *C. iriodon* approach it somewhat.

C. PORCATUS Philippi. Pl. 34, fig. 31.

Shell elate-conic, subperforate, yellowish-green, golden-shining whorls plane, sculptured with five rounded ridges, equalling the interstices, the last angulated; base elevated; aperture higher than wide; columella vertical, entire. (*Philippi.*)

The shell is elevated-conical, nearly steeple-shaped, thin, imperforate, consisting of 7 to 8 whorls. These are perfectly flat, the last passing into the much elevated base in an obtuse angle, and two-fifths the total height. The sculpture consists upon the upper surface of five rounded, slightly elevated girdles as wide as the interstices; upon the base of six. The aperture is rather quadrangular, higher than broad; the outer lip simple, thin, the colu-

mella rounded, without a projection, vertical, and bounded outside by an impressed line, having the appearance of an umbilical fissure. The color is yellowish-green, gold-shining, unmarked, the eroded apex appears white; the liræ of the base are variegated with red.

Alt. 11, diam. 8 mill. (*Philippi*.)

Habitat unknown.

T. porcatus PHIL., Zeitschr. f. Mal. 1849, p. 187; Conchyl. Cab., p. 294, t. 43, f. 9.—“*Eleuchus sulcatus*, Mus. Brit.” teste *Philippi*.

Probably a young *Cantharidus*. It is not an “*Elenchus*.”

C. NITIDULUS *Philippi*. Pl. 34, fig. 32.

Shell turritid-conical, smooth, shining, flesh-colored, painted with spiral pale lines articulated with purple; whorls little convex, separated by deep sutures, the last two-fifths the whole length, obtusely angular; aperture patulous, higher than wide, violaceous inside, iridescent and smooth; columella short, arcuate, terminating in a strong tooth. (*Philippi*.)

The shell is steeple-shaped, smooth and shining, thin, much like *Tr. virgulatus* in contour but very different in coloration. It consists of 7 to 8 whorls, slightly convex, separated by a deep suture; the last is over two-fifths the total length, and at the beginning is indistinctly angular; the base is strongly elevated; the aperture is somewhat widened, higher than broad, rounded, the columella very short, curved, ending in a strong tooth. Upon a flesh-colored ground there are (on the upper surface) 5 whitish and purple-red articulated spiral lines, half as wide as their inter-spaces; on the base there are nine or ten similar lines. The very smooth shining throat gives blue-violet reflections. Alt. 13, diam. 9 mill.

Habitat unknown.

T. nitidulus PHIL., Zeitschr. f. Mal., 1849, p. 171; Conchyl. Cab., p. 295, t. 43, f. 10.

Evidently allied to *C. iriodon*, but probably a distinct species.

B. SCHRAYERI (Troschel) *Philippi*. Pl. 34, figs. 28, 29.

Shell imperforate, elevated-conical, smooth, brown or grayish-corneous, painted with four wide white zones articulated with purple; whorls flattened, the last obtusely angular, base convex, concentrically striate, painted with narrow white, brown-articulated lines; aperture subtetragonal, higher than wide, over $\frac{2}{3}$ the total length. Columella with a fine tooth at base. (*Philippi*.)

This species is similar to *T. iriodon*, *T. virgulatus*, *T. lætus* and *T. minor*, but more broadly conical, more distinctly angled at the periphery, the spire more depressed in proportion to the aperture, and finally the coloration is very diverse. Upon a yellowish or dirty flesh-colored ground there are first, upon the upper half of the whorl, two broad whitish bands, separated by a narrow space, and interrupted by narrow brownish-red streaks; then two narrow white-and-purple spotted bands, of which the lower one is visible only upon the last whorl; finally, there are on the base several narrow white-and-brown spotted concentric lines.

Alt. $10\frac{1}{2}$, diam. 8 mill. (*Philippi*.)

Tasmania (Schroyer).

T. Schroyeri TROSCHEL (in Mus. R. Berolinensi).—*T. Shayeri* PHILIPPI, Conchyl. Cab., p. 131, t. 23, f. 3.

Evidently allied to the mutable *C. iriodon*.

C. CHLORITES Philippi. Pl. 51, fig. 12.

Shell obliquely pyramidal, imperforate, yellowish-green; base slightly convex; whorls transversely sulcate-striate, marginate; suture profound; aperture subquadrangular, lip smooth within. (*Phil.*)

The shell is exactly conical, the whorls entirely flat, the angle of the last rounded. Besides the feeble transverse line mentioned in the text, each whorl has 5 elevated transverse lines; the base has numerous ones, mostly punctate, the color is generally green, unspotted. The aperture exhibits nothing notable; the columella is pretty vertical.

Alt. 7, diam. 6 mill. (*Philippi*.)

West Coast Australia.

T. chlorites PHIL., Conchyl. Cab., p. 60, t. 13, f. 2.—*T. viridulus* MKE., Moll. Nov. Holl. spec., p. 17. (Not *T. viridulus* Gmel.)

Subgenus *BANKIVIA* (Beck) Krauss, 1848.

Section *BANKIVIA* (restricted).

Bankivia BECK in KRAUSS, Die Südafrikanischen Moll., p. 105 (1848).—PHILIPPI, Handbuch der Conchyl. u. Malacozool., p. 212 (1853).—H. & A. AD., Genera Rec. Moll. i, p. 425.—FISCHER, Manuel de Conchyl., p. 819.—TRYON, Struct. and Syst. Conch., ii, p. 313.

The animal of *Bankivia* is unknown. The species have been grouped with *Phasianella* by some authors, but undoubtedly belong in the immediate vicinity of *Cantharidus* and *Phasianotrochus*. The nacreous layer is thin, but may be seen by chipping off the overlying porcellaneous coat.

C. FASCIATUS Menke. Pl. 40, figs. 28-33.

Shell imperforate, elongated, turritid, thin, polished and shining, white, creamy or pink, with spiral bands of pink, purplish-red or purplish-brown, or narrow oblique zigzag stripes of pinkish-brown, usually with a narrow subsutural fascia of dark or pinkish. Spire elevated, slender; apex a little blunt, dark; whorls about 9, very slightly convex, a trifle impressed below the sutures; surface (under a lens) very densely, finely spirally striate; last whorl rounded; base with a few concentric, separated, impressed lines; aperture ovate, outer lip thin, acute, columella sinuous, arcuate above and narrowly reflexed, obliquely truncate below. Alt 19, diam. 8 mill.

Southern Australian Shores.

Phasianella fasciata MENKE, Synops. Meth. Moll., p. 141.—*P. fulminata* MENKE and *P. undatella* MENKE, loc. cit., p. 141. (1830).—*Bankivia varians* (Beck) KRAUSS, Die Südaf. Moll. p. 105, t. 6, f. 1.—PHILIPPI, Conchyl. Cab. (Monogr. *Phasianella* and *Bankivia*), p. 33, t. 5, f. 1-5.—ANGAS, P. Z. S. 1867, p. 216.—VON MARTENS Jahrb. d. deutsch. Mal. Gesell. 1874, p. 130.—*Trochus (Bankivia) fasciatus* WATSON. Rept. on "Challenger" Gastropoda, p. 64.—*B. purpurascens* A. AD. P. Z. S. 1851, p. 171.—*B. major* A. AD. P. Z. S. 1851, p. 171.—*B. nitida* A. AD. P. Z. S. 1851, p. 172.

A variable species in size and coloration. I have seen, besides the color-patterns noticed in the description above, unicolored deep purple examples.

Section *Leiopyrga*, H. and A. Adams.

Leiopyrga H. and A. AD., Ann. and Mag. Nat. Hist. 3d ser., xi, p. 19 (1863).—*Liopyrga* FISCHER, Manuel, p. 810.

Of the animal of *Leiopyrga picturata* Watson says: It has a thin membranaceous *Trochus*-like operculum, but of fewer whorls than usual in the genus. The nacre of the shell is very marked. The mantle of the animal is very large and capacious, but thin. The tentacles are large and very long, strongly ciliated with a long deep posterior channel running down their whole length. The eyes are very minute, on the end of rather long and fine tubercles.

There are four pedal appendages on the right and three on the left side, and there are also the two head lappets common to *Trochus*. The teeth are like those of *Margarita*. (*Challenger Gasteropoda*, p. 65.)

C. PICTURATA H. and A. Adams. Pl. 45, figs. 46-48.

Shell narrowly perforate, turritid, slender, thin, shining, white, with longitudinal undulating or zigzag pinkish or purplish lines, often uniting to form spots at the periphery, or prominently angled there; sometimes with spiral bands at periphery and around umbilicus; whorls about 7, convex, more or less carinated at the periphery, the carina exerted above the sutures on the spire; surface of base marked by distant impressed concentric grooves; suture margined; aperture oval, outer lip thin, columella thin, arcuate not truncate, and slightly expanded above, but not covering the umbilicus.

Alt. 8-12, diam 5-7 mill.

St. Vincent's Gulf and Port Jackson, Australia; Stuart Id., New Zealand.

L. picturata H. & A. AD. Ann. and Mag. N. H., 1863, p. 19.—ANGAS, P. Z. S. 1865, p. 181; P. Z. S. 1867, p. 216.—*Bankivia (Leiopyrga) picturata* E. A. SMITH, Zool. Coll. H. M. S. 'Alert' p. 75.—*Trochus (Leiopyrga) picturata* WATSON, Rept. Challenger Gasteropoda, p. 65.

The specimens of this species before me are like those described by the brothers Adams. There seems to be the same variations in color shown by *Bankivia fasciatus*. Mr. Smith says: A variety has the middle of the whorls encircled by a plain narrow zone, without the series of spots at the periphery of the last. Messrs. Adams described these spots as being 'round' in the specimen they examined; in those before me they are rather angular, being the zigzag turn of the longitudinal lines. A third variety has a pale band around the middle of the last volution which falls at the lower part of the upper ones, the lower portion being pinkish or closely lineolated with pink. The lower half of the body-whorl has a broad pinkish band beneath the central white one, which is succeeded by a narrower plain zone, which in turn is followed by another fine pink one. A fourth form, with the exception of the upper part of the spire and the umbilical region, is of a uniform grayish violet. * * * * The spiral sulcation and ridging is much more developed in some specimens than others. (Zool. Coll. 'Alert,' p. 75.)

C. CINGULATA A. Adams. *Unfigured.*

Shell pyramidal-turbinate, narrowly perforate, thin, shining, purplish, the base whitish, with a series of rufous spots; whorls 4, plane, marked with distant elevated cinguli (3 on the last whorl); base concentrically deeply lirate; umbilical region surrounded by an elevated ridge. (*Ad.*)

Port Essington. (Cuming.)

Leiopyrga cingulata A. AD., P. Z. S., 1863, p. 507.

This is a second and very distinct species of a genus proposed by my brother and myself under the name of *Leiopyrga*. The present species has the whorls encircled with three transverse ridges, and there is a conspicuous ridge around the region of the umbilicus. (*Adams.*)

Subgenus *THALOTIA* Gray, 1847.Section *THALOTIA* (restricted).

Thalotia GRAY ("Synops. Brit. Mus. 1840"?) P. Z. S. 1847, p. 145; Guide syst. dist. Moll. Brit. Mus., p. 150. (1857).—H. and A. AD., Genera, i, p. 420.—FISCHER, Manuel, p. 819.

C. CONICUS Gray. Pl. 46, fig. 73.

Shell imperforate, elevated conical, solid, pinkish or grayish white with crimson apex and numerous close longitudinal dark reddish-brown stripes, often cut into tessellations by the spiral grooves of the surface; spire straightly conical; apex acute; sutures linear; whorls about 7, nearly planulate, the last obtusely subangular at the periphery; whorls of spire encircled by 5 or 6 more or less granose lirae, last whorl with about 13 or 14; wrinkles of increment more or less prominent; aperture rhomboidal; peristome thick, plicate within; columella straight, denticulate, with a strong basal truncation. Alt. 18, diam. 13 mill.; alt. 21, diam. 15 mill.

Western Australia, Southern Australia and Northern Tasmania.

Monodonta conica GRAY, in Capt. King's Survey of Australia, ii, p. 479 (1827).—*T. conicus* PHILIPPI, Conchyl. Cab. p. 130, t. 23, f. 1.—FISCHER, Coq. Viv. p. 135, t. 46, f. 2.—BRAZIER, Proc. Roy. Soc. Tasmania, 1886, p. 197 (1889).

Thalotia conica ANGAS P. Z. S. 1865, p. 179.—? *T. pictus* WOOD, Index Test. suppl. t. 5, f. 28.—*Thalotia picta* A. AD. P. Z. S. 1851, p. 172.—ANGAS, P. Z. S. 1865, p. 179.—TENISON-WOODS,

Proc. Roy. Soc. Tasm. (1877), p. 41.—*Monodonta turrita* MKE., Moll. Nov. Holl., p. 15.—*T. lehmanni* KIENER, Species, genre Trochus, t. 46, f. 2 (not of MENKE).—HOMBR. et JACQ., Voy. an Pole-Sud., Zool. v, p. 54, t. 14, f. 7-8.—CHENU, Manuel, i, p. 359, f. 2659.—*Thalotia woodsiana* ANGAS, P. Z. S. 1872, p. 611, t. 42, f. 4, 5.—*T. Troschellii* PHILIPPI, Conchyl. Cab., p. 131, t. 23, f. 2.

The above synonymy is partly taken from that compiled by BRAZIER, who has published an excellent paper on Tasmanian *Trochidae* in Proc. Roy. Soc. Tasmania, for 1886.

Rather variable in sculpture; the spaces between the spiral ribs often occupied by lirulæ.

I am wholly unable to see any differential characters in Mr. Angas' *T. woodsiana*, except that it is narrower than the majority of specimens of *C. conicus*. The description corresponds absolutely with *C. conicus*. The original figures are copied on pl. 46, figs. 67, 68.

C. BLANDIANUS CROSSE. Pl. 40, fig. 22.

Shell imperforate, elevated-conical, solid, rather thick, ornamented with numerous oblique longitudinally impressed striæ and spiral liræ, articulated with white and violaceous, on a violet-rose ground-color; suture little impressed; whorls 7, plane, the embryonic $1\frac{1}{2}$ smooth, purplish, white edged; the remainder striate, with 6 spiral liræ; the last angulated, slightly descending, nearly flat beneath, decussated by spiral cinguli and oblique striæ above; aperture a little oblique, subquadrate, pearly and lirate within, the liræ near the lip-margin more elevated, as opaque rugæ. Umbilical tract slightly concave in the vicinity of the columella; columellar margin subarcuate, rugose, strongly uniplicate; basal margin corrugated, outer margin thickened, granulate within.

Alt. $18\frac{1}{2}$, diam. 14 mill. (*Crosse.*)

St. Vincent's Gulf, South Australia.

T. Blandianus CROSSE, Journ. de Conchyl. 1864, p. 339, t. 13, f. 1.

C. ABNORMIS CROSSE. Pl. 40, fig. 42.

Shell imperforate, subelevated conical, thick, rather solid, buffish-tawny, ornamented with spiral series of little beads (white and brown articulated) alternating with obsolete striæ; suture little impressed; whorls 6, convexo-plane, the apical 2 whitish, smooth, the following articulate-cingulate, the last slightly descending, subcom-

pressed, obsoletely angular; base slightly convex and like the upper surface in color; aperture a little oblique, subquadrate, lirate within; columellar margin subarcuate, uniplicate, basal and outer margins thickened, rugose within.

Alt. 15, diam. 10 mill. (*Crosse*.)

St. Vincent's Gulf, South Australia.

T. abnormis CROSSE, Journ. de Conchyl. 1864, p. 341, t. 13, f. 2.

C. ELONGATUS Wood. Pl. 45, fig. 56.

Shell imperforate or very narrowly perforate, conic-elongated, thick, whitish, ornamented with radiating livid-brown flammules, brown punctulate; whorls 9, convex, spirally lirate (the liræ unequal) and longitudinally nodose-costate, the nodules more prominent below; sutures impressed; last whorl angulated, depressed beneath the sutures, nodulous at the periphery; very convex and with about 8 concentric liræ beneath, the interstices with intercalated lirulæ; aperture subquadrate, canaliculate within; basal margin arcuate, plicate; columella subangular, concave, strongly truncate at base, with a short callous over the umbilicus.

Alt. 33, diam. 22 mill. (*Fischer*.)

New Caledonian Archipelago.

T. elongatus WOOD, Ind. Test., suppl. t. 5, f. 19.—PHILIPPI, Conchyl. Cab., p. 200, t. 30, f. 4; Abbild. u. Besch. ii, Trochus t. 6, f. 6.—*T. attenuatus* JONAS, Zeitschr. f. Mal. 1844, p. 170.

Distinct from other species in its elongated form and strong longitudinal plication.

C. SERPENTINUS Quoy. Pl. 46, fig. 63.

Shell narrowly perforated, thick, conical, apex acute, grayish-green, painted with radiating chestnut and white flammules; whorls 7, planulate, the first eroded, buff, the following scarcely shining, encircled by 6 to 7 unequal liræ, above and beneath the suture margined and obsoletely nodulose; last whorl carinated, convex beneath and ornamented with 7 articulated concentric liræ; aperture rhomboidal; columella lightly arcuate, subtruncate below.

Alt. 22, diam. 18 mill. (*Fischer*.)

Guam, Marianne Archipelago.

T. serpentinus QUOY in KIENER, species, Genre Trochus, t. 45, f. 3.—CHENU, Manuel, ii, f. 2661.—FISCHER, Coq. Viv., p. 131, t. 45, f. 3.

This shell is quite distinct from its congeners, and remarkable for its rays of brown, more or less shaded with a greenish hue. It belongs to the group of *T. elongatus* and *Kotschyi*. (*Fischer*.)

C. KOTSCHYI Philippi. Pl. 46, figs. 70–72.

Shell narrowly perforated, conoidal, whitish-ashen, ornamented with undulating, oblique, radiating chestnut or blackish stripes; spire acute; whorls 7, the first eroded, the remainder angulated and nodulose above; above the carina obliquely nodulose, below the carina spirally lirate; liræ 4; last whorl biangular, convex beneath, and with 7 concentric brown-spotted liræ. Aperture subquadrate; columella arcuate, white, sinuous, below strongly truncate-dentate.

Alt. 30, diam. 24 mill. (*Fischer*.)

Karrak, Persia.

T. kotschyi PHIL., Zeitschr. f. Mal., 1848, p. 127; Conchyl. Cab., p. 234, t. 35, f. 8.—FISCHER, Coq. Viv., p. 207, t. 69, f. 1.

C. PYRGOS Philippi. Pl. 46, figs. 74–76.

Shell imperforate, acutely conical, rather thin; whorls 9, planulate, ashen or brownish, maculate or obliquely striped with brown; obliquely arcuately peculiarly crispate-striate, spirally cingulate, 6 unequal granose cinguli on the penultimate whorl as wide or narrower than the interstices, which frequently bear minute lirulæ, the upper and lower cinguli more prominent, the others equal. Last whorl carinated; base convex and lirate (with about 8 liræ and interstitial lirulæ); aperture rhomboidal, sulcate within; lip thin; basal margin subcrenulated; columella subhorizontal, slightly arcuate, subtruncate at base, expanding in a short callous over or nearly over the umbilicus above.

Alt. 20, diam. 15 mill.; alt. 23, diam. 17 mill.

Wallis Is. Port Jackson, Australia.

T. pyrgos PHIL. Zeitschr. f. Mal. 1849, p. 189; Conchyl. Cab., p. 297, t. 43, f. 14.—FISCHER, Coq. Viv., p. 368, t. 112, f. 4.—*? Thalotia zebrides* A. AD., P. Z. S. 1851, p. 173.

Distinguished by its straightly conical form, peculiarly crispate striation, and spiral granose liræ.

Two trays of this species are before me; one marked "Java," I know not on whose authority; the other was received from DR. J. C. COX, from Port Jackson.

C. TORRESI E. A. Smith. Pl. 46, fig. 62.

Shell sharply conical, subperforated or with the perforation concealed, greenish (sometimes pinkish red), with oblique white narrow stripes and darker green or rosy black spotting at the base of the whorls and upon the angle of the last. Volutions about 8, flat, margined at the lower part with two rows of closely-packed granules, rather more prominent than five others above. Between these, in well-preserved specimens, very fine liræ (one in each interstice) and oblique lines of growth are discernable. Last whorl rather acutely angled at the periphery, beneath with about 9 concentric rows of granules alternating with others very much finer having smaller subobsolete tubercles. The aperture is obliquely subquadrate; columella a little arcuate at the upper part, white, reflexed over the white umbilical region and subtruncate anteriorly.

Alt. 12, diam. $9\frac{1}{2}$; alt. 13, diam. 12 mill. (Smith.)

Prince of Wales Channel, Torres Straits.

There are two varieties of this pretty species, which may be termed the green and pink. In the green variety the base in three out of the four examples is somewhat pinkish, radiately streaked with white, whilst in the fourth specimen it is green with irregular streaks and has a more tessellated aspect. The perforation is small, and may either be concealed by a thin callócity or remain open. This is a smaller species than *T. fragum* Phil., has more numerous granules (of which there are *five* instead of *four* rows besides the basal girdle), and intervening fine liræ are generally to be met with on the spire which are wanting in Philippi's shell. I should also observe that the columella of *T. fragum*, judging from the figure, is less incurved than in this form. (Smith.)

T. (Thalotia) torresi E. A. SMITH, Zool. Coll. H. M. S. 'Alert,' p. 72, t. vi, f. A. (1884.)

Evidently closely allied to *C. pyrgos* Phil.

C. FLINDERSI Fischer. Pl. 46, fig. 81.

Shell very narrowly perforate, conical, rather thick; whorls 7 to 8, planulate, the first eroded, the succeeding whitish-ashen, radiated with narrow, close and flexuose blackish and violaceous lines; spirally cingulate; liræ 6 on penultimate whorl; last whorl subangular, a little depressed above, dilated in the middle; base con-

vex, ornamented with about 8 liræ; aperture rhomboidal; lip simple; columella arcuate, truncate below.

Alt. 16, diam. 13 mill. (*Fischer.*)

South Australia.

T. flindersi FISCHER, Jour. de Conchyl. xxvi, 1878, p. 65; Coq. Viv., p. 354, t. 110, f. 3.

Distinguished from *C. freycineti* by the less conical form, wider base, stronger spiral ridges, more truncated columellar tooth and different coloration.

C. FREYCINETI Fischer. Pl. 45, fig. 59.

Shell narrowly perforate, conical, rather thick; whorls 7, planulate, the first eroded, buff, the remainder whitish, ornamented with rosy dots and narrow flexuous chestnut flammules; spirally cingulate, about 8 liræ on penultimate whorl; last whorl carinated; base convex with about 8 concentric liræ; aperture subrhomboidal; lip simple; columella white, obsoletely nodose-truncate below.

Alt. 16, diam. 12 mill. (*Fischer.*)

Is. of St. Peter and St. Francis, S. Australia.

T. freycineti FISCHER, Journ. de Conchyl. 1878, p. 64; Coq. Viv., p. 355, t. 110, f. 4.

The form of this shell is more regularly conical than in *T. flindersi* or *T. freycineti*.

C. BAUDINI Fischer. Pl. 46, fig. 80.

Shell imperforate, conic-elongate, rather thick; whorls 6 to 7, planulate, the first buff, eroded, the following whitish, ornamented with sparse rosy points and angular chestnut streaks; spirally lirate, liræ about 8 on penultimate whorl; last whorl subangular, depressed above; base convex, with about 8 concentric liræ; aperture rhomboidal; lip simple; columella short, subnodose-truncate below. Alt. 11, diam. 9 mill. (*Fischer.*)

King Island, S. Australia.

T. baudini FISCHER, Journ. de Conchyl. 1878, p. 65; Coq. Viv., p. 356, t. 110, f. 5.

Differs from the two preceding species in lacking an umbilical perforation, smaller size, by the depression of the upper part of the whorl and the coloration.

C. YOKOHAMENSIS Bock. Pl. 40, fig. 40.

Shell imperforate, acutely pyramidal, dull white, marked at intervals with irregular dark brown blotches, and the base ornamented with brown lines radiating from the center (where they are paler, almost orange) to the periphery. Whorls 7, quite flat, spirally ridged; ridges crenulate or subgranular through being crossed by oblique raised striæ; on the upper whorls there are about 6 ridges, and on the last, which is acutely angled at the middle, they are about 14 in number; that at the carina consisting of two or three small approximated ones, and hence broader than the rest. Aperture slightly oblique, subquadrate, upper half above the carina shallowly sulcate, lower portion smooth; columella white, callous, terminating in an oblique truncation.

Alt. 18, diam. 15 mill. (*Bock.*)

Yokohama, Japan.

T. (Thalotia) yokohamensis CARL BOCK, Proc. Zool. Soc. London, 1878, p. 727, t. 46, f. 3.

C. GILVUS Philippi. Pl. 51, fig. 15.

Shell small, conical, imperforate, transversely granulate-sulcate, white, longitudinally painted with dirty yellowish stripes; whorls flattened, margined and prominent at base, the last one angular, encircled by six elevated granose cinguli; base flat, closely sulcate, scarcely granulate; aperture depressed, rhomboidal; columella slightly oblique, cylindrical, scarcely truncate at base.

Alt. 11, diam. $9\frac{1}{2}$ mill. (*Philippi.*)

Habitat unknown.

T. gilvus, PHIL., Zeitschr. f. Mal. 1849, p. 157; Conchyl. Cab., p. 298, t. 43, f. 16.

C. MUNDULA Adams and Angas. *Unfigured.*

Shell elevated-conical, subperforate, whitish, obsoletely painted with longitudinal purplish flammules; whorls plane, concave in the middle, at the sutures with a prominent rounded ridge, transversely lirate, liræ equal, subgranulose, base concentrically lirate, with radiating striæ in the interstices; aperture subquadrate; lip arcuate, ending anteriorly in an obtuse tooth; lip obsoletely sulcate within.

Alt. 12, diam. 9 mill. (*Ad. and Ang.*)

Shark's Bay, Western Australia.

Thalotia mundula AD. AND ANG. P. Z. S. 1864, p. 37.

Characterized by the rounded elevated ridge at the sutures, the transverse granular liræ, and the obscure flame-like longitudinal markings. (*Ad. and Ang.*)

Section ODONTOTROCHUS Fisher, 1880.

Odontotrochus FISCHER, Coquilles Vivantes, Monograph of Trochus, p. 419 (1880); Manuel de Conchyl., p. 819.

C. CHLOROSTOMUS Menke. Pl. 40, fig. 25, 26.

Shell imperforate, conical, elevated-trochiform, solid, first whorls red, the following reddish-brown, more or less tinged with buff, and in places with olive-green, and sparsely maculate with whitish, the spiral ribs more or less articulated minutely with whitish; whorls 8 to 9, flat or a trifle concave, acutely carinated, the carina a trifle projecting above the sutures; upper surface of each whorl encircled by 10 to 12 spiral liræ, only slightly elevated, and showing strong, regular oblique stræ of increment in the interliral interstices; base flat, with about 10 concentric narrow liræ, strongly, regularly radiately striate; aperture rhomboidal, very oblique, iridescent and sulcate within; outer and basal lips edged with green, plicate-denticulate within; columella curved, ending in a strong tooth at base, green. Alt. 24, diam. 20 mill.; alt. 25, diam. 18 mill.

Australian shores.

T. chlorostomus MENKE, Moll. nov. Holl. spec., p. 17.—PHILIPPI, Abbild. u. Beschr. i, Trochus t. 2, f. 8; Conchyl. Cab., p. 106, t. 17, f. 6; p. 43, f. 5.—FISCHER, Coq. Viv., p. 282, t. 92, f. 2.—*Ziziphinus chlorostoma* REEVE, Conch. Icon. f. 26.

Peculiar in the elevated straightly conical form, carinated periphery and coloration.

Unfigured, unidentified species of Cantharidus, Elenchus, Thalotia, etc.

ELENCHUS DILATATUS Sowerby. Testa brevi, subcinerea, spiralter subdistanter lirata; spira brevi; anfr. quatuor, ultimo lato; apertura dilatata, viridi-cœruleo iridescente. (*Sowb.*)

New Zealand (Mr. Brazier).

Remarkable for the expansion of the last whorl. (*Sowb.*)

Elenchus dilatatus G. B. SOWERBY in Proc. Zool. Soc. 1870, p. 251.—*Cantharidus dilatatus* HUTTON, Proc. Linn. Soc. N. S. W. 1884, p. 363.

ELENCHUS SPLENDIDULUS Swainson (Treatise on Malacol., p. 352). An undescribed *Cantharidus*.

ELENCHUS OCELLATUS Gould. Testa parva, elevata, ovato-conica, polita, postice ex rufo vivescens, antice rubescens, lineis volventibus pallidis rufomarginatis circ. 4 et lineis flexuosus obliquis ornata; anfr. 7, vix convexis, punctis albis circ. 6 cinctis, ultimo ad peripheram obtuse angulato, basi convexo; apertura ovata, intus virescens; columella pallide, dente obsoleto albido instructa.

Axis 12; diam. 7 mill. Allied to *E. minor*. (Gould.)

Sydney, N. S. Wales.

GOULD, Proc. Bost. Soc. Nat. Hist. viii, 1861, p. 18.

ELENCHUS EXIGUUS Gould. Testa minuta, lævis, ovato-conica, acute, flavide-rosacea vel fulvida, plus minusve lineis flexuosis saturatioribus vel vittis articulatis ornata; anfr. 5, ventricosus; apertura rotundato-ovata; columella planata, decolorata, dente acuto deflecto munita. Axis 2, diam. $1\frac{1}{2}$ mill. (Gould.)

Port Jackson.

GOULD, Proc. Bost. Soc. N. H. viii, 1861, p. 18.

CANTHARIDUS LINEOLARIS Gould. Testa elevato-conica, perforata, aureo-vividis, lineis angulatis luteis prope suturam dilatatis ibi nigro maculatis, striis incrementi et striis volventibus subtilissimis reticulata; anfr. 7, planulatis, ultimo angulato; apertura parva, subtriangularis. Axis 7, diam. 4 mill. (Gould.)

Sydney, N. S. Wales.

GOULD, Proc. Bost. Soc. N. H. viii, 1861, p. 18.

CANTHARIDUS CINGULIGER A. Ad. Testa elevato-conica, cinerea, punctis fuscis in lineis flammulatis depositis, transversim sulcata; anfr. planis, cingula prominenti supra suturam, anfractu ultimo angulato, cingulo plano cincto; umbilico subobtecto; columella recta; labro intus albo, lævi. (A. Ad.)

Habitat unknown.

A. Ad. P. Z. S. 1851, p. 169.

CANTHARIDUS PUNCTULOSUS A. Ad. Testa elevato-conica, imperforata, lævi, nitida, cinerea, transversim sulcata; cingulis transversis, luteo-alboque punctatis nigro-maculatis, ornata; anfr. planis, ultimo acute angulato; regione umbilicali rosea; apertura subquadrata; columella alba, recta, antice subtruncata; labro intus lævi, limbo punctulato. (A. Ad.)

Swan River, 4 fms. (Jukes).

A. Ad. P. Z. S. 1851, p. 169.

CANTHIRIDUS MONILIGER A. Ad. Testa elevato-conica imperforata, cinerea, cingulis moniliformibus transversis ornata; interstitiis longitudinaliter elevate striatis; anfr. planis, apice purpureo, sutura canaliculata; anfractu ultimo angulato; apertura subquadrata; columella antice subtruncata; labro intus sulcato. (A. Ad.)

Swan River, 8 fms. (Jukes.)

A. Ad. P. Z. S. 1851, p. 169.

CANTHIRIDUS ARTICULARIS A. Ad. Testa elevato-conica, lævi, nitida, cinerea; cingulis confertis, nigro alboque articulatis ornata; interstitiis longitudinaliter striatis; anfr. planis, ultimo angulato, basi planiuscula, cingulis articulatis sculpta; apertura subquadrata; columella antice subtruncata; labro intus lævi, limbo articulado. (A. Ad.)

Habitat unknown.

A. ADAMS, P. Z. S. 1851, p. 170.

CANTHIRIDUS ARTIZONA A. Ad. Testa elevate conoidea, pallida; cingulis carneolis angustis elevatis transversis ornata; interstitiis transversim striatis; anfractu ultimo angulato; apertura intus viridescenti; labro intus lirato, limbo rufo articulado. (A. Ad.)

Habitat unknown.

A. ADAMS, P. Z. S. 1851, p. 170.

CANTHIRIDUS RUFOZONA A. Ad. Testa conoidea, cingulis rufis transversis, interstitiis planis traversa; anfractu ultimo rotundato; labro intus albo, lævi, limbo rufo-articulado; columella alba. (Ad.)

Habitat unknown.

A. ADAMS, P. Z. S. 1851, p. 1870.

CANTHIRIDUS NIGRICANS A. Ad. Testa depresso-conica atropurpurea, cingulis elevatis transversis ornata; interstitiis longitudinaliter oblique striatis; anfractu ultimo subangulato; labro intus albo, sublævi, limbo nigro. (A. Ad.)

Habitat unknown.

A. ADAMS, P. Z. S. 1851, p. 170.

CANTHIRIDUS PALLIDULUS A. Ad. Testa elevato-conica, imperforata, pallida; cingulis transversis elevatis luteo-articulatus ornata; interstitiis concinne longitudinaliter striatis; columella subrecta, in medio tumida; labro intus lirato. (Ad.)

Australia.

A. ADAMS, P. Z. S. 1851, p. 170.

ELEUCHUS VULGARIS A. Ad. Testa ovato-conoidea, subturrita, imperforata, lævigata, virenti, transversim tenuissime striata; lineis undulatis viridis picta; basi convexa; apertura ovata; columella basi dente acuto terminata; labro postice subangulato. (A. Ad.)

Swan River.

A. ADAMS, in P. Z. S. 1851, p. 171.

THALOTIA TESSELATA Tenison-Woods.

Shell small, subumbilicate, conical, pale olive, spotted or tessellated with white; whorls 7, sub-convex, everywhere finely obliquely, spirally transversely striate; furnished with five keels which are broad, flattened, and the upper and lower ones broader and more prominent; base convex, keeled; aperture sub-quadrate, outer lip acute, thin, margined within, inner lip white, conspicuous; throat silvery nacreous, lirate. The interstices between the keels sometimes striate. Alt. 6, diam. $4\frac{1}{2}$ mill. (*Ten.-Woods.*)

Tasmania.

TENISON-WOODS, in Trans. and Proc. Roy. Soc. Vict. xiv, p. 58. (1877).

THALOTIA DUBIA Tenison-Woods.

Shell turbinately conical, solid, whorls intensely rose-purple and rose flamed; whorls 7, convex (the four spiral flattened) keels 4, small, distant, conspicuously granular; granules small, neat, and rose-purple in color; interstices clothed with a yellow silky periostraca; suture deep, broadly canaliculate; base flattened, spirally lirate and radiately striate; aperture sub-quadrate, thickened, conspicuously multidentate; columella tuberculate, margined and closely toothed. Alt. 18, diam. 15 mill.

In general form resembling *T. conica*, but smaller, and more closely ornamented. The mouth is also an approach to a *Clanculus*. (*Tenison-Woods.*)

Clark's Islands.

TENISON-WOODS, in Trans. and Proc. Roy. Soc. Vict. xiv, p. 59 (1877).

THALOTIA MARGINATA Tenison-Woods.

Shell narrowly conical, oblique, solid, tessellated with small olive or purple spots; whorls $8\frac{1}{2}$, concave above, below broadly carinate or marginate, girdled with four lines of granules, of which the uppermost is often the largest, closely decussate with oblique squamose striae; keel elevated, somewhat flattened, and projecting over the

suture in a conspicuous manner; granules rounded, subobsolete; apex acute, aperture obliquely quadrate, smooth, nacreous, of a rosy silver hue, with one conspicuous angular groove in the middle; columella rounded, truncate below, not tuberculate; base convexly rounded, subumbilicate, elegantly lirate, the liræ being granular and alternating large and small, tessellate and radiately striate. Alt. 18, diam. 14 mill.

The young are distinctly umbilicate. Many specimens have between the larger liræ smaller ones on the whorls of the spire. The species differs especially from all previously described in the roundly convex base, and non-tuberculose columella. It comes very near to *T. zebrides* Ad. which is common at Moreton Bay, and with which it has been previously confounded (*Tenison-Woods*).

Moreton Bay.

J. E. TENISON-WOODS, in Proc. Linn. Soc. N. S. W. iv, p. 109 (1880).

THALOTIA ZEBUENSIS A. Adams. Testa elevato-conoidea, perforata, atro-fusca, fasciis longitudinalibus ornata, transversim sulcata; anfr. planulatis, ultimo rotundato, basi convexa; labio subrecto, antice reflexo, dilatato; apertura subcirculari, intus alba; labro intus lævi, atro-marginato. (*A. Ad.*)

San Nicholas, Id. of Zebu, in sandy mud, 6 fms. (Cuming.)

A. Ad. in P. Z. S. 1851, p. 172.

THALOTIA STRIGATA A. Adams. Testa turrata-conica, perforate, albidula, fasciis latis rufo-fuscis radiata; anfr. in medio angulatis, porcis transversis subgranulosus, interstitiis longitudinaliter striatis ornata, basi convexa, concentrice porcata; umbilico aperto; apertura subrotundata; columella subflexuosa, basi truncata; labro intus lirato, margine crenulato. (*A. Ad.*)

Swan Point, N. Australia (Dring.)

A. ADAMS, P. Z. S. 1851, p. 173.

THALOTIA ZEBRIDES A. Adams. Testa turrito-conica, subperforata, virescenti, lineis atropurpureis longitudinalibus ornata, porcis transversis confertis sculpta; longitudinaliter striata, basi convexa; umbilico subobtecto; columella sinuata, callo terminata; labro intus lirato, margine atropurpureo articulado. (*A. Ad.*)

Habitat unknown.

A. ADAMS in P. Z. S. 1851, p. 173.

THALOTIA SUTURALIS A. Adams. Testa conica, subperforata, virescenti, lineis purpureis longitudinalibus undulatis ornata; trans-

versim lirata, longitudinaliter striata; anfractibus planis, supra suturam elevatis; sutura canaliculata, basi planiuscula; columella brevi, basi tuberculo terminata; labro intus levi, viridi. (*A. Ad.*)

Cape Upstart, Torres Sts., Australia; under stones at low water. (Dring.)

A. ADAMS, P. Z. S. 1851, p. 173.

THALOTIA TRICINGULATA A. Adams. Testa conica, imperforata, nigra, lineis albis longitudinalibus ornata; anfr. angulatis, ultimo cingulis tribus transversis prominentibus instructo; basi convexa, cingulis concentricis nigro alboque articulatis ornata; labio ad basim tuberculato; apertura subrotundata, intus alba; labro intus liris elevatis, atro-marginato. (*A. Ad.*)

Habitat unknown.

A. ADAMS, P. Z. S. 1851, p. 173.

THALOTIA CRENELLIFERA A. Adams. Testa elevato conica, imperforata; rufescente, rubro maculosa; spira acuminata, apice rubro; anfractibus planulatis, liris confertis, crenellatis, transversis, interstitiis oblique longitudinaliter striatis; anfractu ultimo subangulato, basi convexiuscula; apertura subquadrata, intus alba; columella alba, incurvata, antice truncata. (*A. Ad.*)

Australia (Mus. Cuming).

A. ADAMS, P. Z. S. 1851, p. 173.

CANTHARIDUS DECORATUS Adams and Angas. Testa turbinato-conoidea, imperforata, cupreo-aurantiaca, flammulis longitudinalibus albo articulatis, in anfractu ultimo fascia lata albo articulata et serie transversa macularum quadratarum albarum ornata, apice carneola tincto; anfractibus planis, transversim sulcatis, sulcis distantibus, postice obsoletis; anfractu ultimo ad peripheriam rotundato; apertura subquadrata, labio vix recto, in medio callosa, labro intus sulcato.

Long. 6, diam. 4 mill. (*Ad. and Ang.*)

York Peninsula, South Australia.

AD. AND ANGAS, P. Z. S. 1864, p. 37.

A small but beautifully ornamented species, of a rich golden-orange color, marked with white spots and flammules. (*Ad. Ang.*)

BANKIVIA LUGUBERIS Gould. Testa parva, ovato turrata, glabra, rubida, lineis inequalibus satorioribus cincta; apice pallido; anfr. 8, ventricosus, apertura subcircularis, tridentem longitudinis

testæ adequans; columella tenui, alba, arcissime perforata; labro acuto, pallido, intus rufo submarginato.

Axis 12, diam. 6 mill. (*Gould.*)

GOULD, in Proc. Bost. Soc. N. H. viii, 1861, p. 18.

Sydney, N. S. W.

Genus GAZA, Watson, 1878.

Gaza WATSON, Journ. Linn. Soc. Lond., xiv, p. 601; Report on Challenger Gasteropoda, p. 93.—DALL, Rep. on 'Blake' Gasteropoda, p. 354.

The animal of *G. superba* has been described by Dr. Dall as follows:

An examination of the soft parts showed the operculum to be very thin, light brown, and with about seven whorls. The animal was of a whitish color without any spots or markings, and with very large black eyes set on a good-sized peduncle closely adjacent to and behind the tentacles. There is a single narrow gill in the usual position. The tentacles are long, large, and rather slender; the foot short, broad, and bluntly rounded in front, behind almost truncate, in fact the contracted specimen looked almost as if there was a broad posterior indentation in the middle line. The muzzle is long, narrow, subcylindrical above and transversely expanded at its distal end, which is semi-lunar with a densely papillose surface and fringed edges. This expansion is nearly three times as wide as the stem of the muzzle. Epipodium with a large lobe behind the eye peduncle but not connected with it; behind the lobe is one long process and then a shorter one. The frill behind is merely puckered, but from under the borders of the operculum on each side protrude three good-sized processes. Behind the opercular lobe the epipodium terminates in a prominent point, concave and papillose on its upper surface. There are no frontal lobes between the tentacula. The epipodial point extends some distance behind the posterior end of the foot. The jaw is like that of *Calliostoma* in shape, composed of brown four-sided translucent prismatic rodlets which give under the microscope a reticular marking of diamond-shaped spots to the surface of the jaw; the two sides are not united in the middle line. The dentition closely resembles that of *Lunella versicolor* Gmelin as figured by Troschel (*Geb. der Schnecken*, ii, pl. 20, fig. 7), except that the bases of the rhachidian and lateral teeth are subcircular, and on a few of the scythe shaped cusps of the numerous

uncini are a few denticles. There are five lateral teeth, and between twenty and thirty uncini. (*Dall.*)

The nucleus of *G. superba* is often caducous, and in such specimens the apex is pierced with a circular perforation $1\frac{1}{2}$ mill. in diam., which is continuous with the umbilicus. There does not appear to be any particular difference between the nucleus and the early whorls, its loss would therefore seem to be due merely to its fragility. In none of those in which it remains is there any indication of its being reinforced by a shelly deposit. (*Dall.*)

I regard *Gaza* and its subgenera as a group of *Trochidæ* related to *Lunella* of the *Turbinidæ* on the one hand, and *Umbonium* on the other. (*Dall.*)

Our knowledge of this beautiful group is derived wholly from the publications of WATSON and of DALL. The species are all deep sea dwellers, living mostly at depths of 100 fms. or greater.

G. DEDALA Watson. Pl. 36, fig. 12.

Shell depressedly globose, with a convexly conical spire, thin, translucent, horny, nacreous in its whole texture, and iridescent on the surface, with a slightly reverted and narrowly thickened lip, a thin edged twisted pillar, the point of which runs out into a bluntly mucronated angle. Sculpture: Longitudinals—the whole surface is covered with strong, puckered, oblique lines of growth, which are sharp-edged but flattened, rather regular, with many minuter ones in the intervals. The longitudinals are cross-hatched with spirals, which are stronger and more regular, but not perfectly uniform, consisting of square threads and furrows of equal breadth, and both scored by the longitudinals; on the earlier whorls these spirals disappear before the longitudinals do; and on the base they become on the outside feebler, closer, and finer, in the middle broader and flatter, and stronger again toward the centre of the shell. Color, delicate yellowish, with a horny translucency and exquisite iridescence, which under the lens appears brilliant. Spire high and slightly scalar. Apex very small, flatly rounded, the embryonic 1 $\frac{1}{2}$ whorl very slightly projecting. Whorls 7 of gradual increase, well rounded, the last slightly angulated below, and on the base flattened, but rather less so towards the mouth, where there is a slight contraction and downward turning of the whole whorl, without, however, any descending of the lip at its junction with the body. Suture very distinct, but not impressed, mouth rather large, very oblique, semioval. Outer lip reflected and thickened internally

by a strong but narrow, equal, rounded, white pearly callus, which almost disappears just at the upper corner, and which has a very slight furrow round its margin; it does not descend at all. Inner lip—from the corner of the outer lip a very thin layer of nacre spreads out a little way across the body, but then ceases entirely. The pillar is spread out at its base as a confined, flattened, unevenly inclined, semicircular, iridescent umbilical pad, from the left corner of which the pillar proper projects, with a narrow but rounded edge, twisted, straight, bending to the left, and advances into a sharply angulated, and, as seen from behind, even mucronated junction with the basal mouth-edge, to which the umbilical pad curving round the back of the pillar also attains. The inside is scored with the external sculpture, and is brilliantly iridescent. The umbilical pad is defined by a narrow furrow, and in front by a slightly tumid ridge, which is the least nacreous part of the whole shell. Operculum is membranaceous, horny, yellowish, with about six to seven turns, each strongly defined by a narrow line of thickening, and sharply scored with minute oblique radiating lines.

Alt. 0·65 in.; diam. 0·87 in. Mouth, height 0·43, breadth 0·41 in. (*Watson.*)

Kandavu, Fiji, 610 fms.

Gaza dædala WATSON, Journ. Linn. Soc. London, xiv, p. 602; Challenger Gasteropoda, p. 93, t. 7, f. 12.

G. SUPERBA Dall. Pl. 48, figs. 16, 17.

Shell in general features recalling *Gaza dædala* Watson, much of whose description would apply with little change to this species. Whorls eight, in the adult roundly shouldered below the suture, rounded at the periphery, somewhat flattened on the base, deeply and widely umbilicated, the umbilicus a little more than half covered by a nacreous callus; first two and a half whorls transparent, not nacreous, very obtuse, the nucleus not prominent; the next three and a half whorls smooth, except for faintest lines of growth, glassy with the nacre shining through; the remainder of the shell covered with delicate and distinct lines of growth, sometimes a little more pronounced near the suture and by revolving lines almost too shallow to be called grooves, most prominent on the periphery, evanescent on the flattened part of the base and above near the suture; on the last whorl these are about 0·5 mm. apart; the region near the suture is almost smooth. Suture

very distinct, but not channelled; umbilicus bordered by an edge from which the flattened base falls away, and the straight walls forming an almost perfect cone; the last whorl contracted just before the reflected lip, which, above, rounds out in advance of its junction with the suture, the last quarter of an inch of which descends on the whorl, giving the aperture a downward look; aperture oblique above, arching more nearly to a perpendicular below, smoothly, evenly reflected and thickened from the pillar to the suture, with an internal channel behind the thickening; pillar callous above, thinly and unevenly reflected half-way across the umbilicus, gently and very obliquely descending and smoothly passing into the basal part of the lip. The interior of the aperture, the lip, the umbilical callus, and a slight wash near the sutural junction, brilliantly nacreous; base and body whorl within the mouth not so; upper surface of shell distinctly tinted with fawn color, base waxen white, the nacre perceptible through the thinner portions. Alt. 24.0; maj. diam. 35.5 mill; of umbilicus, 8.0; of aperture, 13.0 mill. Defl. about 100°. (*Dall.*)

Off Montserrat, Santa Cruz, Barbados, and in the Gulf between Mississippi delta and Cedar Keys, Fla., 209 to 324 fms.

Callogaza superba DALL, Bull. Mus. Comp. Zool. ix, p. 49, 1881;
Gaza superba DALL, l.c. xviii, p. 354, t. 22, f. 4, 4a.

Dr. Dall writes of this species: I included this species with the subgenus *Callogaza* in my preliminary paper, but the receipt of more specimens from the U. S. Fish Commission dredgings leads me to doubt whether the umbilicus always remains uncovered, and though I have seen no specimens in which it is wholly closed, yet I suspect it becomes so at times. An adult specimen measures 40 mill. wide by 32 high, and this appears to be about the average of the species.

G. RATHBUNI Dall.

Another species of about the same size (38 x 24 mill.), *G. rathbuni* Dall, which differs from *G. superba* in being more depressed, with stronger spiral grooving, a slightly smaller umbilicus, and more flattened over the sutures, has since turned up among the 'Albatross' collections, dredged in the Pacific, in 392 fms., sand, near the Galapagos Islands. (*Dall*, Bull. Mus. Comp. Zool. xviii, p. 354, foot note.)

G. FISCHERI Dall. Pl. 49, fig. 37.

This shell is of six and a half whorls, and closely resembles *Gaza dædala* Watson, except in the following particulars: It is much more depressed proportionally; the upper margin of the aperture is distinctly depressed below its general plane; and the radiating lines, almost microscopic in *G. dædala*, are in this form impressed in the early whorls near the suture, so as to produce a succession of short ripples, following the recurved lines of growth, which give a fringe-like ornamentation to the suture, at the rate of about five ripples to a millimeter. Nothing like this is visible in any of the specimens of *G. superba*. The margin of the suture in this form is distinctly appressed, forming a narrow border. The operculum has about seven whorls. The umbilicus is completely floored over. The soft parts are like those of *G. superba*, but the tentacles are shorter and stouter, the lateral lobes of the epipodium proportionally larger, there is one more lateral process, and the muzzle is not so much expanded laterally at its termination.

Max. diam. of base, 25·0; min. diam., 20·0; alt., 16·0 mill. (*Dall.*)

Off Santa Lucia, in 423 fms., gray ooze.

We know so little about the limits of variation in this beautiful group that it is with some doubt that I apply a name to these specimens. The difference in form and sculpture, and the distance between Fiji where *G. dædala* was collected and the Antilles has seemed to me sufficient warrant in this instance. (*Dall.*)

G. fischeri DALL, Bull. Mus. Comp. Zool. xviii, p. 355. (1889.)

Subgenus CALLOGAZA Dall.

Callogaza DALL, Bull. Mus. Comp. Zool. ix, p. 49 (1881); *l. c.* xviii, p. 356.

G. WATSONI Dall. Pl. 49, figs. 25, 26, 27, 28. Pl. 48, figs. 11, 12.

Shell much smaller than the last and but slightly nacreous; whorls six and a quarter, having the same general form as in the last species, but with a more prominent nucleus; nucleus small, bulbous, dark brown; first two and a half whorls glassy, brown spotted, smooth; subsequently the exterior two-thirds of the upper surface of the whorls sculptured with four or five strong revolving threads; the space between them and the suture above, with strong, even, flexuously radiating, shining, rounded plications (about eight to a millimeter) which pass obliquely over the revolving threads and appear again on the base as strong regular plications in the

umbilical region, extending from the umbilical carina one-third of the way toward the periphery. The base is covered with numerous revolving threads flattened until their interspaces appear like grooves; the umbilicus similarly formed to the last species, but somewhat more turritid internally. Last whorl less contracted behind the lip, which is not produced forward above, as in *superba*; the umbilical callus not nacreous, with a granular surface, white and covering less than half the umbilicus; lip and aperture otherwise much the same as in *superba*, but only slightly nacreous. Base waxy white, top the same, with cloudy radiating brown blotches near the suture and on the periphery; some of the revolving threads are also continuously brown.

Alt. 7.75 maj. diam. 12.5; of umbilicus, 2.5; of aperture, 5.5 mill. Defl. about 120°. (*Dall.*)

Off Havana, Cuba, in 177–200 fms.; *off Bahia Honda, Cuba* in 640 fms.; *off Barbados*, in 84–154 fms.

Callogaza Watsoni DALL, Bull. Mus. Comp. Zool. ix, p. 50 (1881); *l.c.* xviii, p. 356, t. 22, f. 7, 7a; t. 23, f. 1, 1a; t. 24, f. 2, 2a.—*Margarita filogyra* DALL, Bull. M. C. Z. 1881, p. 42 (young shell).

This shell named by me *Margarita filogyra* is without doubt in part based on young specimens of *Callogaza Watsoni*. But with regard to some of the others I am puzzled as to whether to so refer them or not. In any case, the weight of probability is in favor of their being eventually united. There are certain differences in the umbilicus to which I do not, in the absence of soft parts, feel able to give a definite value; while the fact that these specimens have a slightly but distinctly thickened lip adds to the obscurity. At all events, whether wholly identical with *C. Watsoni* or not (Figures 11, 12, Plate 48, certainly are), the *M. filogyra* is in an uncertain state, and for that reason I prefer to omit the name in my list of established species until I obtain more definite material for study. I retain the figures which had been prepared of the supposed young shells.

An adult specimen affords the following notes: The body is yellowish, the sides streaked with ashy-gray, a few flecks of which also appear between the tentacles. The body is longer than in *Gaza* proper and distinctly pointed behind. The tentacles are short and stout, with a small inner angle or expansion opposite the distinct eye peduncle, which bears a large very black eye. The

muzzle is proportionately shorter than in Gaza, subcylindrical, granulose at the end, but not laterally expanded. The gill as in Gaza *superba*, but broader in proportion to its length. The very large anterior lobe of the epipodium is followed by seven gradually decreasing lateral processes, of which five are under the operculum, and are separated by small rounded lobes of the epipodial margin. The posterior angle of the epipodium is pointed as in Gaza, extending considerably beyond the operculum, but not as far as the foot. The dentition differs considerably from that of Gaza. It most nearly resembles that of *Forskälia declivis* Forskäl, as figured by Troschel (*Gebiss d. Schneck.*, II. pl. xxiv, fig. 14.) The rhachidian tooth has a single three pointed cusp, without the accessory denticles of *Forskälia*, the laterals have two or three accessory denticles, the uncini, unlike *Forskälia*, are denticulated all along the inner edges of their blade-like cusps, except toward the margin of the radula, where they gradually become simple. It will be observed that in the soft parts there are features which sufficiently distinguish this group from Gaza, according to ordinary standards.

Subgenus MICROGAZA Dall.

Microgaza DALL, Bull. Mus. Comp. Zool. ix, p. 50 (1881); *l.c.* xviii, p. 357.

G. ROTELLA Dall. Pl. 48, figs. 5, 6.

Shell depressed, with five whorls, somewhat flattened above and below; nucleus small, translucent white, and with the two first whorls polished, smooth or marked only by faint growth lines; remainder of the whorls with a narrow puckered band revolving immediately below the suture, on which the shell matter is as it were pinched up into slight elevations at regular intervals, about half a millimeter apart. In some specimens, outside of this band an impressed line revolves with the shell; remainder smooth, shining or with evanescent traces of revolving lines impressed from within and strongest about the rounded periphery; base rounded toward the umbilical carina over which it seems to be drawn into flexuously radiating well-marked plications (about thirty-two on the last turn) which disappear a third of the way toward the periphery; wall of the umbilicus concave, overhung by the carina, turns of the shell so coiled that the part of each whorl uncovered by its successor forms a narrow spiral plane ascending to the apex like a spiral staircase or

screw thread. Pillar straight, thin, with no callus; aperture rounded except at the angle of the umbilical carina; margin thin, sharp, not reflected or thickened; no callus on the body whorl in the aperture; shell whitish or greenish; nacre less brilliant in dead or deep-water specimens; with zigzag brown lines variously transversely disposed and disappearing on the base.

Alt. 4.0 maj. diam. 6.75; of umbilicus, 1.75; of aperture, 2.5 mill. (*Dall.*)

Off Barbados, in 100 fms.; *off Bahia Honda, Cuba*, 220 fms.; 36 miles S. $\frac{1}{2}$ W. from *Cape Hatteras, N. Carolina*, in 124 fms.

The operculum is like that of *Gaza*, and has six or seven whorls. None of the specimens show any tendency to a reflected lip, yet it is, of course, possible that no completely adult specimen was obtained. The animal has a short stout foot, bluntly rounded at either end. It is of a pinkish tint. The tentacula are very long and the eyes large. The muzzle is rounded and not very long, its extremity plain. There are no frontal lobes. The epipodium has a very small anterior lobe with a cirrus behind it, then a space without cirri, a long process just in front of the opercular disk, and one, shorter, under it on each side making three in all. There is no posterior point to the epipodium, and only the above three cirri on each side. The jaw is somewhat like that of *Umbonium*, but shorter and broader. The radula, however, bears no resemblance to that of *Umbonium* (*Rotella* Lam.). The teeth are very elegant. The rhachidian tooth in general form (except the cusp) not unlike that of *Calliostoma granulata* Born (*Troschel*, II, pl. xxiv, fig. 18), but the central spur of the cusp is long and slender like a stiletto, extending considerably behind the posterior edge of the base of the tooth. On each side of it are four stout sharp rather short denticles, radiating as from the median point of the front edge of the cusp. The laterals recall those of *Gibbula divaricata* (*Troschel*, loc. cit., fig. 6), but have more, larger, and stronger denticles, all on the posterior edge of the cusp, or the edge away from the rhachis, the uncini are rather few in number, the cusps sword shaped, sigmoid, the inner ones denticulated on both edges. The number of laterals is five. The radula as a whole is very short and small.

The depressed form and margined suture, as well as the kind of coloration, in this shell recall *Umbonium*. The texture of the shell and the character of its umbilicus are precisely as in *Callogaza*. The soft parts indicate its place to be in that vicinity.

Until a larger number of the myriad of species shall have been examined, it is evident that the characters of the dentition in their classification cannot be formulated except in a provisional manner.

(Dall.)

Genus BEMBIX Watson, 1878.

Bembix WATSON, Journ. Linn. Soc. London, xiv, p. 603; Challenger Gasteropoda, p. 95.

A remarkable feature of this genus is its being covered with a thin extremely persistent smooth fibrous epidermis, like that of some of the *Helices*. This epidermis swells up and becomes pustulated in water. In form the shell recalls some of the *Cantharidus* group, but is thinner and on the base more tumid; the axis is perforated, and the pillar is thin, reverted and merely angulated in front. The operculum is membranaceous and multispiral. (*Watson.*)

B. *ÆOLA* Watson. Pl. 40, figs. 10, 11.

Shell high, concavely conical, carinated, sculptured on the upper whorls, smooth or wrinkled below, thin, with a tumid lirated base, narrowly umbilicated, with a smooth epidermis, thin, but especially so on the base, more or less nacreous all over under a thin porcellanous upper layer. Sculpture: The first three whorls (after the embryonic apex) are reticulated by three sharp remote spirals, and rather stronger, slightly oblique longitudinals, which rise at their intersections into small sharp pyramidal tubercles; the interstices are a little broader than high. This system gradually dies out and leaves the surface smooth, only the row of infra-sutural tubercles survives in an enlarged but depressed form, and springing from these some sinuous, oblique, and slightly irregular longitudinal puckerings appear on the last whorl, which is nearly bisected by the sharpish, slightly expressed, finely tubercled carina. This bisection of the last whorl arises from the great prolongation and tumidity of the base, on which, below the carina, are five narrow, equally parted, spiral threads, and two intra-umbilical ones, which are more continuous. Besides this larger system of sculpture, the whole surface is covered with minute, oblique, irregular, and interrupted puckerings of the epidermis. Color a brownish yellow, but below the epidermis there is a thin pure white porcellanous layer, through which and the epidermis the sheen of the nacreous layer gleams. The base is whiter, the epidermis there being very thin. Inside the mouth is an exquisite roseate nacre, spire high, with a

slightly concave contour, the lines of which are hardly swollen out by the slight tumidity of the last whorl. Apex eroded, but evidently small. Whorls 7 or 8, of regular increase, quite flat on the side slopes, except the last, which is very slightly constricted below the suture, a very little tumid on the upper slope, sharply carinated but not much angulated at the suture, and very tumid on the base. Suture linear, strongly defined on the upper whorls by the square furrow lying between the lines of tubercles which marginate the suture above and below. On the last whorl it becomes slightly pouting from the projection of the carina and the slight infra-sutural constriction. Mouth nearly square, very little oblique in the line of its advance, but standing out a little obliquely to the axis of the shell. Outer lip thin, not descending. Pillar lip thin, spread out broadly at its base over the umbilicus, which it largely conceals, with a deep narrow furrow behind it. Curving over to the right, it advances, thin and pointed, to its angular junction with the basal lip. Umbilicus defined by a spiral thread and with two other spirals within it. It is not small but concealed by the pillar-lip.

Alt. 0·82 in.; diam. 0·63 in.; mouth, height 0·4; breadth 0·38 in. (*Watson.*)

It is evidently not remote from *Trochus argenteonitens*, Lischke (Japan. Meeres-Conch., vol. iii, p. 67), a species I know only from the figure and description. The whole sculpture, however, seems distinct though similar. (*Watson.*)

Off Japan in 565 fms.

B. æola WATSON, Journ. Linn. Soc. London, xiv, p. 603 (1878); Challenger Gasteropoda, p. 95, t. 7, f. 13.

Genus CHLOROSTOMA Swainson, 1840.

Chlorostoma SWAINS. Malacol., p. 350.—PHILIPPI, Handb. der Conchyl. u. Mal., p. 209.—A. AD. (in part), P. Z. S. 1851, p. 180.—GRAY, Guide Syst. dist. Moll. Brit. Mus., p. 154.—H. and A. AD. Gen. Rec. Moll. i, p. 428.—TRYON, Struct. and Syst. Conch. ii, p. 311.—*Omphalius* PHILIPPI, Zeitschr. f. Mal. 1847, p. 21; Handbuch, p. 210.—GRAY, Guide Syst. dist., p. 154.—TRYON, S. and S. Conch., p. 310.—H. and A. AD., Genera, p. 429.—TROSCHEL, Das Gebiss der Schnecken, ii, p. 232.—*Neomphalius* FISCHER, Manuel de Conchyl., p. 821 (1885).—*Phorcus* A. AD. Monog. Trochidae, P. Z. S. 1851, p. 156 (not *Phorcus* Risso).—*Tegula* LESSON, Illust. de

Zoologie, t. 51 (1832) (no description).—H. and A. AD., Genera, i, p. 426.

The genus *Chlorostoma* replaces on American shores the old world genus *Gibbula*. The more prominent shell characters are the callous which is continued from the columella partly around (or even covering) the umbilicus, and the bi- or tri-dentate base of the columella. The dentition is peculiar, and at once separates these shells from all other Trochidæ. The rhachidian tooth is broader than long, the reflected portion extending nearly its whole breadth, narrowly reflected and with irregularly denticulated edge. The laterals number 5 on each side. The uncini have either denticulate or simple cusps (pl. 50, fig. 10, *C. funebræ*; fig. 13, *Omphalius excavatus*).

The distribution of the species of *Chlorostoma* into sections is difficult on account of the coalescence of characters throughout the group; and many species go equally well in *Chlorostoma* or *Omphalius*; in general, *Omphalius* includes umbilicate species with spirally lirate or granose whorls, but some undoubted *Omphalius* are smooth, and some granose species are imperforate. Corresponding variations occur in the large conical typical *Chlorostoma*; so that no sharp line can be drawn. *C. pellisserpentis*, the only species of *Tegula* (Less.) Gray, is perhaps distinct enough to have a sectional name.

Oriental Species.

The following key, slightly modified from Lischke, will usually guide one to the species of *Chlorostoma* inhabiting Japanese waters:

A. Umbilicus covered.

1. Longitudinally plicate:
 - a. Large, folds strong, base spirally lirate, *C. argyrostoma*.
 - b. Smaller; folds fine, close; base smooth, *C. distinguenda*.
2. Without longitudinal folds:
 - a. Coal-black, with orange apex, *C. nigricolor*.
 - b. Olive-colored, with lead-colored apex, *C. lischkei*.

B. Openly umbilicate.

1. Periphery bluntly angled; base plano-convex or flat:
 - a. Elevated; with broad low folds or smooth, *C. rustica*.
 - b. Depressed; folds very narrow and close, *C. nigerrima*.
2. Periphery acutely angled; base plano-concave.

a. Strongly plicate; base spirally lirate, *C. carpenteri*.

b. Base smooth.

a. Obsoletely plicate, *C. pfeifferi*.

b. Entirely smooth, *C. achates*.

C. ARGYROSTOMA Gmelin. Pl. 25, figs. 11, 12.

Shell imperforate, conical, solid, heavy, black, except the eroded first whorls which are yellow, the base lighter, olive or pinkish; depressed; whorls about 7, finely longitudinally corrugated, and much less obviously spirally sculptured, the longitudinal sculpture obsolete on the base; aperture very oblique, smooth and nacreous within; outer lip edged with black; columella oblique, decidedly dentate midway, and frequently less markedly so at the base; umbilical tract covered by a heavy green callus.

Alt. 40, diam. 45 mill.

Philippines; Chinese and Japanese Seas.

Trochus argyrostomus Gmel., *Syst. Nat.*, xiii, p. 3583.—LISCHE, *Jap. Meeres-Conchyl.*, p. 96, t. 7, f. 3-5.—FISCHER, *Coq. Vir.*, p. 105, t. 29, f. 4 (Turbo).—*T. distinguendus* DUNKER, *Mollusca Japonica*, p. 22, t. 3, f. 1. (1861.)

An abundant and variable species. It may be separated from the following forms by the imperforate base, green or olive umbilical callus, and finely, regularly plicate upper surface.

Var. *DISTINGUENDA* Dunker. Pl. 26, fig. 20.

Longitudinal folds less strong, close; base smooth; umbilical callus white. Alt. 18, diam. 20 mill.

Japan.

C. NIGERRIMA Gmelin. Pl. 25, figs. 9, 10.

Shell umbilicated, rather depressed conical, solid, black or purplish-black, lighter beneath; spire conic, sutures impressed; whorls about 6, very obliquely striate, longitudinally finely corrugated, the folds small, dichotomose a short distance beneath the periphery, very regular and close; base nearly flat, smooth; periphery bluntly angular; aperture very oblique; columella toothed in the middle and more obsoletely at the base, expanding above in a callus half surrounding the umbilicus and partly covering it.

Alt. 20, diam. 25 mill.

Japan.

Trochus nigerrimus GMEL., *Syst. Nat.*, xiii, p. 3572.—PHILIPPI, *Conchyl. Cab.*, t. 10, f. 13.—LISCHKE, *Jap. Meeres-Conchyl.*, p. 97, t. 7, f. 6, 7 (not *Turbo nigerrimus* GMEL.,=*Monodonta nigerrima* (Gm.) (Phil.))—*Trochus niger, umbilicatus, etc.*, CHEMNITZ, *Conchyl. Cab.*, v, p. 98, f. 1647.—*T. niger* PHILIPPI, *Conchyl. Cab.*, p. 369.—FISCHER, *Coq. Viv.*, p. 372, t. 113, f. 4.—*Chlorostoma corrugatum* A. ADAMS, *P. Z. S.*, 1851, p. 182.—*Chlorostoma undatella* GOULD, *Proc. Bost. Soc. N. H.*, 1861, p. 20.

This species is most nearly allied to *C. argyrostoma*, and in the sculpture differs from that form only in the rather smaller folds above, and the lack of distinct spiral striæ or liræ. It is smaller than *argyrostoma*, more depressed, and always umbilicated.

C. RUSTICA Gmelin. Pl. 25, figs. 1, 2, 3, 4.

Shell umbilicate, conic, heavy, solid, chocolate-colored or brownish-olivaceous; spire conical, more or less elevated; suture distinctly impressed; whorls 6-7, moderately convex or nearly flat, sometimes tumid just below the sutures, and either smooth or longitudinally plicate, the folds usually obsolescent, and visible only for a short distance below the sutures; spirally obsoletely striate; body-whorl obtusely angular at the periphery; base nearly flat; aperture very oblique; columella with one or two teeth below, expanded above in a white callus, which half surrounds the narrow, deep circular umbilicus. Alt. 33, diam. 32 mill.

Japan.

Trochus rusticus GMEL., *Syst. Nat.*, xiii, p. 3572.—PHILIPPI, *Conchyl. Cab.*, p. 48, t. 10, f. 11, 12.—FISCHER, *Coq. Viv.*, p. 163, t. 55, f. 1, t. 112, f. 2.—LISCHKE, *Jap. Meeres-Conchyl.*, p. 97.

Periphery less sharply carinate than in *C. nordmanni* and *C. pfeifferi*; less strongly sculptured than *C. carpenteri*, and not lirate beneath; more elevated than *C. nigerrima* and not nearly so finely corrugated above.

C. NIGRICOLOR Dunker. Pl. 26, figs. 21, 22.

Shell conoid, imperforate, obsoletely striate, black; whorls plano-convex, the last subangulate, base convex, dull reddish or yellowish; umbilical callus green, pitted; columella very oblique, unidentate; fauces smooth, pearly. Alt. 17, diam. 28 mill. (*Dunker.*)

Japan.

Trochus nigricolor DKR., *Malak. Blat.*, 1860, p. 237, and *Moll. Jap.*, p. 22, t. 3, f. 2.—LISCHKE, *Jap. Meeres-Conchyl.*, p. 100, t. 7, f.

1, 2.—*Chlorostoma xanthostigma* A. ADAMS, *P. Z. S.*, 1851, p. 183 (*Teste* E. A. SMITH, *Ann. and Mag. N. H.*, xvi, 1875, p. 112, and WATSON, *Challenger Moll.*, p. 70).

My scientific conscience will not allow me to substitute for Dr. Dunker's name for this species, that proposed by Adams. The latter would never have been identified had it not been for the specimens in the British Museum; for Adams' description gives neither measurement nor locality, and is not sufficient for identification. I do not consider specimens placed in the British or any other Museum as "published" in any sense, unless they are so described or figured that they may be identified *without referring to the types*. And further, I do not see how anything but evil can result from the practice of quoting names from specimens in the British Museum in synonymy.

Of this species Lischke says: It stands extremely close to *T. brunneus*. The sculpture is identical, save that my examples lack the upper of the two spiral liræ mentioned. The umbilical pit is in my adult examples of *T. brunneus*, much narrower than in the present species, in one example entirely concealed. *T. nigricolor* seems also to be larger and proportionately broader than *T. brunneus*. My largest example of *brunneus* is 34 mill. alt., 29 in diam.; of *nigricolor* 41 mill. alt., 36 diam. But the main difference is in the color; the upper surface and the larger part of the base is pitchy-black in *T. nigricolor*, the eroded apex orange, the umbilical callus white or a beautiful green, (*Lischke*.)

The "*T. brunneus*" which is referred to above is not the true *Chlorostoma brunneum* Phil., a species of the Californian coast, but a distinct form as yet undescribed, of which a single small specimen is before me. This shell is figured on pl. 26, fig. 16. It may be called *Chlorostoma Lischkei*. On account of the insufficiency of my material at present, I defer a formal description. *Vide* LISCHKE, *Jap. Meeres-Conchylien*, i, p. 99, "*T. brunneus*."

C. PFEIFFER Philippi. Pl. 26, figs. 13, 14, 15.

Shell umbilicate, conical, solid, dark purplish or brownish-purple, obliquely striate, the base radiately striate with white; spire strictly conical, elevated, apex eroded, whorls about 7, planulate above, the last acutely angular at the periphery, the base plano-concave; whorls smooth or with fine spiral striæ, and ill-defined longitudinal folds; aperture subhorizontal, occupying about half the area of the

base; columella dentate in the middle, expanded above in a white callus; umbilicus profound, circular, surrounded by a white zone.

Alt. 30, diam. 33 mill.

Japan.

Trochus pfeifferi PHILIPPI, *Zeitschr. f. Mal.*, 1846, p. 104, and *Conchyl. Caw.*, p. 152, t. 25, f. 2.—LISCHKE, *Jap. Meeres-Conchyl.*, p. 98.—FISCHER, *Coq. Viv.*, p. 336, t. 105, f. 1.—*T. nordmanni* SCHRENCK, *Bull. de l'Acad. de St. Petersb.*, v, p. 511 (1862); *Nord-jap. Moll.*, p. 349, t. 15, f. 1, 2; *Reisen u. Forschungen Amur-Lande*, p. 349, t. 15, f. 1, 2.—*Chlorostoma achates* GLD., *Proc. Bost. Soc. N. H.*, viii, p. 20. (1861.)

The typical *C. pfeifferi* is strictly conical, with nearly straight lateral outlines; the whorls are obsoletely longitudinally plicated; the base is slightly concave, and radiately striate or streaked with white. Var. *ACHATES* Gould, differs in having a smooth surface, the folds entirely obsolete.

C. CARPENTERI Dunker. Pl. 25, figs. 5, 6, 7, 8.

Shell umbilicate, conical, solid, grayish-black, but seen on close inspection to be minutely, densely striped with black on a whitish ground; spire strictly conical, apex yellowish; whorls 6 to 7, flat, densely, very obliquely sublamellose-striate, and with coarse, wavy, irregular longitudinal folds over the entire upper surface; last whorl acutely carinated at the periphery; base plano-concave, with about four strong spiral liræ; aperture extremely oblique, columella strongly dentate in the middle, expanded above and reflexed partly over the umbilicus; umbilicus white within, spirally ribbed.

Alt. 26, diam. 25; alt. 54, diam. 43 mill.

Nagasaki and Decima, Japan.

Trochus carpenteri DUNKER, *Malak. Bl.*, vi, p. 237 (1860); and *Moll. Japonica*, p. 21, t. 3, f. 12.—LISCHKE, *Jap. Meeres-Conchyl.*, p. 98, t. 7, f. 8, 9, 10.—FISCHER, *Coq. Viv.*, p. 170, t. 57, f. 1.

More coarsely sculptured than any other Japanese species.

Species from the West Coast of the Americas.

C. PELLISERPENTIS Wood. Pl. 20, figs. 1, 2.

Shell imperforate, conical, elevated, very thick, solid and heavy; color yellowish or pinkish, marked with narrow angular patches or interrupted longitudinal oblique stripes of black; spire strictly conical, apex acute, sutures linear; whorls 8, encircled by weakly

granose liræ, separated by narrow impressed lines; periphery nearly smooth; base smooth or lirate, eroded in front of the aperture; aperture oblique, outer lip thick within, smooth, bevelled to an edge; columella oblique, bearing in the middle a heavy tubercle, at the base less prominently toothed. Alt. 43, diam. 38 mill.

W. Coast of Central America; Gulf of California.

Trochus pellis-serpentis WOOD, *Ind. Test. Suppl.*, t. 5, f. 4.—PHILIPPI, *Conchyl. Cab.*, p. 105, t. 17, f. 4.—FISCHER, *Coq. Viv.*, p. 165, t. 55, f. 3.—*T. strigilatus* ANTON, *Verzeichniss*, p. 56.—PHILIPPI, *Abbild. u. Beschreib.*, i, *Trochus* t. 2, f. 9.—*Tegula elegans* LESSON, *Illustrations de Zoologie*, t. 51 (1832).

This species is the type of the subgenus *Tegula*. It differs from the species of *Chlorostoma* with which I have associated it in the heavier, larger columellar tubercle, more numerous whorls and different color-pattern.

C. GALLINA Forbes. Pl. 20, fig. 5; pl. 28, figs. 52, 53.

Shell imperforate, heavy, solid, thick, conoidal, dark purplish or blackish, longitudinally striped or speckled with whitish, the stripes occupying the interstices between close, narrow superficial folds of the surface, which may be well-marked, or obsolete, continuous or cut into granules by equally close spiral furrows, the latter sometimes predominating; spire conoidal, the apex usually blunt, eroded and yellow; body-whorl rounded at the periphery; base convex, more or less eroded in front of the aperture; whorls 5 to 6; aperture oblique; outer lip black-edged, smooth and pearly within; columella short, arcuate, strongly bidentate near the base; place of the umbilicus marked by a pit. Alt. 28–40, diam. 26–34 mill.

California; L. California.

Trochus (Monodonta) gallina FORBES, *P. Z. S.*, 1850, p. 271, t. 11, f. 8.—*T. gallina* FISCHER, *Coq. Viv.*, p. 358, t. 111, f. 1.—*T. pyri-formis* GOULD, *Proc. Bost. Soc. N. H.*, 1853, p. 382.

The above description applies to the typical form; the sculpture of the surface is superficial and very variable, as is the distribution of the color markings, which is dependent upon the sculpture. It is sometimes difficult to separate this from *C. funebræ*. See remarks under that species.

Var. TINCTA Hemphill.

In this form the longitudinal markings and sculpture are obsolete and the spiral grooves generally scarcely visible above; the color is

yellow-greenish or blackish, the apex eroded, yellow; and there is a streak of yellow on the base just below the columellar teeth.

C. FUNEbraLE A. Adams. Pl. 28, figs. 42, 43, 44.

This species is similar to *C. gallina* in form and characters of the aperture. It is lusterless, purple or black, the apex usually eroded, orange-colored; the teeth of the columella are white; and there is never a yellowish streak at the base, as in the var. *tincta* of the last species. The whorls are spirally lirate, sometimes smooth except on the base, sometimes strongly lirate above. The suture is margined below by an impressed line, and by elevated, foliaceous incremental lamellæ. This last feature may almost always be detected, although sometimes but very slightly developed.

Alt. 35, diam. 32; alt. 25, diam. 26 mill.

L. California and Northward.

C. funebrate A. AD., *P. Z. S.*, 1854, p. 316.—CARPENTER, *Rept. on Moll. W. Coast N. A.*, 1863, p. 652.—KEEP, *West Coast Shells*, p. 84, f. 71.—*Trochus funebris* FISCHER, *Coq. Viv.*, p. 173, t. 57, f. 3.—*T. marginatus* NUTTALL, *mss.*—*T. maestus* var., GOULD, *Exped. Shells.*, p. 183, f. 214.

One of the most abundant mollusks of the Californian Coast. The shell never shows the longitudinal folds and stripes characteristic of typical *C. gallina*, nor has it the basal yellowish streak of the smooth var. *tincta*. The foliated subsutural margin is characteristic, also, though not always developed.

C. BRUNNEUM Philippi. Pl. 27, figs 36–38.

Shell imperforate, conical, solid, russet-yellow, brown, orange-colored or deep crimson; spire conic; sutures deeply impressed; whorls about 7, convex, smooth, obliquely lightly striate, the last sometimes obsoletely undulated or plicate below the suture; base depressed, deeply concave in the center; aperture very oblique; columella one or two toothed near the base; umbilical callus white; place of the umbilicus deeply excavated.

Alt. 32, diam. 36; alt. 38, diam. 35 mill.

Californian Coast.

Trochus brunneus PHILIPPI, *Zeitschr. f. Mal.*, 1848, p. 189, and *Conchyl. Cab.*, p. 300, t. 43, f. 19.—LISCHKE, *Jap. Meeres-Conchyl.*, p. 99.—FISCHER, *Coq. Viv.*, p. 365, t. 112, f. 1.

The smooth surface and the color of this species will distinguish it from any of its allies. It is according to Lischke found upon the

coast of Japan (Nagasaki, Decima); but I share the doubt expressed by Fischer as to its actual occurrence there. The relative altitude and the size are extremely variable.

C. PULLIGO Martyn. Pl. 26, figs. 23, 24, 25.

Shell deeply and widely umbilicate, conical, solid, dull purplish or brown, when worn often orange, obliquely streaked with white or unicolorous; spire elevated; whorls 7, flattened, the upper ones finely spirally striate and sometimes very obsoletely plicate; the remainder smooth, obliquely finely striate; base flattened, slightly convex, obliquely streaked, concave and white around the umbilicus; body-whorl bluntly angled at the periphery; aperture very oblique, smaller than usual in *Chlorostoma*; columella thin, obtusely dentate, ending above in a white callus which partly covers the umbilicus. Alt. 35, diam. 32; alt. 22, diam. 22–27 mill.

Sitka to California.

Trochus pulligo MARTYN, *Universal Conch.*, t. 76.—PHILIPPI, *Conchyl. Cab.*, p. 84, t. 15, f. 3.—FISCHER, *Cog. Viv.*, p. 232, t. 80, f. 1.—*T. marcidus* GOULD, *Bost. Journ. N. H.*, xvi, 1852, p. .

A handsome and rare species, more widely umbilicated than any other from the West Coast. There is no spiral ridge within the umbilicus.

C. MONTEREYI Kiener. Pl. 27, figs. 27, 28, 29.

Shell umbilicate, *strictly conical*, rather thin, light olivaceous or pale corneous; spire conical, with nearly straight outlines; apex acute; sutures linear; whorls 7, flattened, encircled by numerous fine liræ, which become obsolete on the lower whorl, which shows usually very ill-defined obliquely descending small folds, at right angles to the incremental striæ; body-whorl acutely angular at the periphery; *base flat, spirally, subobsoletely lirated*; aperture subhorizontal; outer lip thin, margined with brown or corneous; columella subhorizontal, curved, toothed below the middle, *receding above, not spreading around the umbilicus* as in the other species; umbilicus funnel-shaped, rapidly becoming very narrow, white within, its edge defined by an angle. Alt. 28–39, diam. 34–42 mill.

Californian Coast.

Trochus montereyi KIENER, *Species*, gen. *Trochus*, t. 33, f. 1, 1a.—FISCHER, *Cog. Viv.*, p. 104, t. 33, f. 1.

This form, of which a number of specimens are before me, is very distinct from the other species. Its general aspect is that of an *Eutrochus*. The whorls and base are flat; and the color a light fawn. It is the "*Chlorostoma pfeifferi*" of American writers on Californian shells.

C. STRIATULATUM Kiener. Pl. 27, figs. 34, 35.

Shell imperforate, conoid, apex subobtusely, covered with a brown or cinereous unicolored cuticle; whorls 6, separated by linear suture, obliquely striate, transversely finely lirate, the liræ obsolete on the last whorl; last whorl slightly convex, carinate, beneath planulate or slightly convex, marked with obsolete concentric liræ; aperture ample, rhomboid, the right margin oblique; columella arcuate, denticulate in the middle, emarginate below the denticle; umbilical area depressed. Alt. 18, diam. 21 mill. (*Fischer*.)

Coast of California (?)

T. striatulus KIENER, *Species*, gen. *Trochus*, t. 33, f. 3.—FISCHER, *Cog. Viv.*, p. 106, t. 33, f. 3.

I have not seen this form, nor has it been mentioned by writers on Californian mollusks. It differs, according to Fischer, from *C. montereyi*, in the shorter more obtuse spire, more convex whorls and in lacking an umbilicus.

C. AUREOTINCTUM Forbes. Pl. 27, figs. 31, 32, 33.

Shell umbilicate, conoidal, thick, solid, black or cinereous; spire conical, apex generally eroded; sutures impressed; whorls about 5, convex, spirally coarsely ridged below, radiately plicate above; the revolving ridges 5 in number, the folds of the upper surface disappearing with age; base rounded, concave around the umbilicus; periphery rounded; aperture oblique; columella with a blunt tubercle in the middle and a smaller one below it, slightly reflexed above, joined to the upper margin by a heavy white callus extending across the parietal wall; umbilicus wide, deep bright orange-colored within.

Alt. 38, diam. 35; alt. 22, diam. 26 mill.

California and L. California.

T. aureotinctus FORBES, *P. Z. S.* 1850, p. 271, t. 11, f. 7.—CARPENTER, *Rept. on Moll. W. Coast N. A.*, p. 652.—FISCHER, *Cog. Viv.* (gen. *Turbo*), p. 94, t. 31, f. 1.—*Turbo cateniferus* KIENER, *Species*, genre *Turbo*, t. 31, f. 1 (not *T. cateniferus* Pot. et Mich.).

The more prominent features of this species are found in the heavy, solid shell, coarsely ridged below and the orange-colored

umbilicus. The aperture is less oblique than in any of the preceding species of *Chlorostoma*.

C. RUGOSUM A. Adams. Pl. 26, fig. 26.

Shell narrowly umbilicate, conoidal, solid, heavy, dull cinereous, more or less variegated by brown, blackish or red streaks; spire conoidal, generally eroded and white or yellow at the apex; whorls, about 5, obliquely striate, radiately coarsely and irregularly plicate and rugose above, sometimes nearly smooth; periphery rounded; base convex, concentrically lirate; aperture oblique; columella strongly dentate in the middle or below it, with a second small tooth at the base; edge of the columella rather deeply curved above the tooth, but spreading at its junction with the whorl, bounding and somewhat narrowing the umbilicus by a white callus, which does not extend to the upper margin of the aperture; umbilicus deep, white within. Alt. 26, diam. 27 mill.

L. California; Gulf of California.

Chlorostoma rugosum A. AD., *P. Z. S.*, 1851, p. 182.—*T. rugosus* FISCHER, *Coq. Viv.*, p. 231, t. 75, f. 3.

A rude, rugose species, like *C. aureotinctum*; but much less coarsely sculptured, with narrower umbilicus, different columella, and parietal wall lacking the callus of that form. Var. *RUFOTINCTUM* Carpenter (pl. 27, fig. 30) is smaller, alt. 20, diam. 21 mill., and radiately striped with lusterless red. The spiral lirulæ are sometimes visible also upon the upper surface.

Species of Peru and Chili.

C. ATRUM Lesson. Pl. 28, figs. 40, 41.

Shell imperforate, conical, more or less depressed, heavy, solid, lusterless black; whorls about 6, moderately convex, separated by impressed sutures, smooth, except for slight incremental striæ; body whorl more or less depressed, rounded or subangular at the periphery; base flattened, concave in the center, eroded and light purplish in front of the aperture; aperture very oblique, the outer lip black-margined, smooth and pearly within; columella oblique, obtusely dentate in the middle; umbilico-columellar tract covered by a white callus, excavated at the position of the umbilicus, and bearing a spiral rib. Alt. 35, diam 40; alt. 26, diam. 40 mill.

Coasts of Chili and Bolivia.

Trochus ater LESSON, *Voy. de la Coquille*, p. 344, t. 16, f. 2 (1826).—D'ORBIGNY *Voy. dans l'Amér. mérid.*, p. 409.—GOULD, *U. S. Explor. Exped.*, t. 211.—GAY, *Hist. física y polít. de Chile*, viii, p. 142, t. 4, f. 2.—PHILIPPI, *Conchyl. Cab.*, p. 198, t. 30, f. 1.—FISCHER, *Coq. Viv.* (gen. Turbo), p. 109, t. 30, f. 2.

The largest American Chlorostoma. Some specimens are much depressed. The dimensions are frequently smaller than above given. Fisher gives alt. 50, diam. 54 mill. as the measurements of a specimen in the Paris collection.

Var. MÆSTUM JONAS. Pl. 28, figs. 50, 51.

This form differs from the preceding in being smaller, narrower and more elevated. Alt. 28, diam. 26–28 mill.

Coast of Chili.

All the specimens I have seen are very much eroded.

T. mæstus JONAS, *Zeitschr. f. Malak.*, 1844, p. 113.—PHILIPPI, *Conchyl. Cab.*, p. 199, t. 30, f. 2.—GAY, *Hist. fis. y polít. Chile*, t. 4, f. 3.—FISCHER, *Coq. Viv.*, p. 276, t. 91, f. 1.

C. EURYOMPHALUS JONAS. Pl. 27, figs. 39.

Shell umbilicate, conical, solid, black or purplish; spire elevated, conical; whorls about 6, somewhat convex, nearly smooth, the last more or less angulate at the periphery, sometimes obtusely bicarinate; aperture rather small, oblique, columella arcuate, spreading above in a white callus; umbilicus white within, somewhat funnel-shaped, bearing a spiral rib which terminates in a denticle in the middle of the columella. Alt. 28–33, diam. 28–33 mill.

Coast of Chili.

T. euryomphalus JONAS, *Zeitschr. f. Malak.*, 1844, p. 115.—PHILIPPI, *Conchyl. Cab.*, p. 155, t. 25, f. 7.—FISCHER, *Coq. Viv.*, p. 107, t. 31, f. 4.—*Turbo luctuosus* var., KIENER, *Species*, t. 31, f. 4.—*Trochus kieneri* HUPE, in GAY, *Hist. fis. y polít. Chile*, viii, p. 144, t. 4, f. 1.

Allied to the following species, but narrower, more elevated, and much less distinctly carinated. It bears about the same relation to *C. luctuosum* that *C. mæstum* does to *C. atrum*, and should perhaps rank as a variety of that species.

C. LUCTUOSUM d'Orbigny. Pl. 28, figs. 45, 46.

Shell broadly umbilicate, depressed conical, solid, heavy, black or purplish; spire more or less depressed, sutures linear; whorls 5

to 6, the upper ones with a strong carina midway between the sutures, the last carinated at the periphery and above, generally showing a less prominent carina on the base near the periphery; aperture oblique, columella oblique, arcuate; umbilicus broad and deep, with a spiral rib within.

Alt. 26, diam. 40; alt. 35, diam. 44 mill.

W. coast of S. America, from Callao to Valparaiso.

Trochus luctuosus D'ORB., *Voy. dans l'Amér. Mérid.*, p. 409, t. 76, f. 16-19.—PHILIPPI, *Conchyl. Cab.*, p. 153, t. 25, f. 4, 5.—FISCHER, *Cog. Viv.*, p. 106, t. 31, f. 3.—*T. bicarinatus* POT. ET MICH., *Galerie*, i, t. 30, f. 1-3 (not *T. bicarinatus* Lam., a fossil species).—*T. carinatus* KOCH, in PHILIPPI, *Abbild.*, *Trochus*, t. 2, f. 3 (not *T. carinatus* Borson, a fossil species).—*Chlorostoma tropidophorum* A. AD., *P. Z. S.*, 1851, p. 183.

The wide umbilicus and strongly keeled whorls separate this form from the other species.

C. TRIDENTATUM Potiez et Michaud. Pl. 28, figs. 47, 48.

Shell *minutely perforate*, conoidal, elevated, heavy and solid, black or purplish; whorls 5 to 6, slightly convex, smooth, the last with rounded periphery; base somewhat flattened, deeply *eroded in front of the aperture*; aperture small, oblique, the outer lip thick and lirate within, the columella short, oblique, *distinctly tridentate* at the base; umbilicus circular, minute.

Alt. 19-22, diam. 15-18 mill.

Coasts of Peru and Chili.

Monodonta tridentata P. ET M., *Galerie du Mus. de Douai*, i, p. 321, t. 29, f. 16, 17.—*Trochus tridentatus* PHIL., *Conchyl. Cab.*, p. 153, t. 25, f. 3.—FISCHER, *Cog. Viv.*, p. 172, t. 57, f. 2.—*T. tridens* MKE. in PHILIPPI, *Abbild.*, *Trochus*, t. 4, f. 10.—*T. stenomphalus* JONAS, *Zeitschr. f. Mal.*, , p. 114.—*T. microstomus* D'ORBIGNY, *Voy. dans l'Amér. Mérid.*, p. 410, t. 76, f. 20, 21.

* * *

(*Omphalius*.)

C. VIRIDULUM Gmelin. Pl. 29, figs. 54-56.

Shell umbilicate, conoidal, solid, whitish-grayish or greenish, radiately striped above with crimson or rich brown, beneath spotted or radiately striped with the same color; spire rather obtuse, short; whorls 6, convex, encircled by spiral liræ which are more or less

beaded upon the upper surface, the interstices between them minutely spirally striated; on the penultimate whorl they number about 6; below the periphery the liræ are finer, closer, and nearly smooth; last whorl obtusely angulate or rounded at the periphery; base rather flattened, somewhat concave around the umbilicus, and generally eroded in front of the aperture; aperture oblique; outer lip beveled to an acute edge, which is usually margined with green and is sulcated or crenulated, the furrows corresponding to the liræ of the outer surface; the pearly throat is also more or less sulcate; columella arcuate, expanded above in a bright green callus which partly surrounds the umbilicus, at its base green, bearing a tubercular tooth, followed by several smaller ones; basal margin smooth or denticulate within; umbilicus wide and deep, white or greenish within. Alt. 22, diam. 25 mill.

Rio Janeiro, Northward to West Indies.

Trochus viridulus GMEL., *Syst. Nat.*, xiii, p. 3574.—PHILIPPI, *Conchyl. Cab.*, p. 75, t. 14, f. 5.—FISCHER, *Cog. Viv.*, p. 210, t. 70, f. 1 (not *T. viridulus* Mke.)—*T. Cruciat*us "Chemnitz," PHILIPPI, *Conchyl. Cab.*, p. 76, t. 14, f. 8 (not of Linn.)—*T. articulatus* D'ORB., *Voy. dans l'Amér. Mérid.*, p. 409.

Under the above specific name I am compelled to unite a number of species hertofore considered distinct. The description and figures given above apply to the typical form found on the E. Coast of S. America. This form is nearly always *green* beneath the superficial coat.

Var. RETICULATUM Wood. Pl. 29, figs. 63, 64, 68, 69.

This form is more depressed than *C. viridulum* and smaller; the base is flatter; the periphery carinate; the liræ of the upper surface more regular, more distinctly beaded, the interliræ interstices with fewer spiral striæ, often with minute beaded lirulæ. Coloration as in *C. viridulum*, consisting of radiating stripes. Aperture and columella tinged with green or white. Alt. 15, diam. 18–19 mill.

Panama to Mazatlan.

T. reticulatus WOOD., *Ind. Test. Suppl.*, t. 6, f. 38.—FISCHER, *Cog. Viv.*, p. 212, t. 70, f. 2.—*T. brazilianus* MENKE, *Syn. meth. Moll.*, p. 142 (1830).—Philippi, *Conchyl. Cab.*, p. 76, t. 14, f. 10.

A form precisely like this in every character except that it has a somewhat more rounded periphery is before me from the Gulf coast of Costa Rica.

Var. *LIGULATUM* Menke. Pl. 29, figs. 58, 59, 60.

This is an extremely variable form. The shell may be either very much depressed or as high as broad. It may be spirally sculptured with numerous narrow, unequal liræ, or as strongly cingulate as the preceding form. The best development of this variety is shown by the specimens before me from San Diego. They are elevated, turbinated, strongly granose-lirate; the base is deeply eroded in front of the aperture; the color is brownish-yellow, with numerous close narrow longitudinal purplish-brown stripes, but the whole surface is so dingy that it appears unicolored; the spiral liræ are subequal, the grains low and elongated in the direction of the liræ. The whorls are rounder than in *C. viridulum*, and the aperture decidedly smaller, and lacking green tinge on the columella.

Alt. 22, diam. 22; alt. 14, diam. 18 mill.

Panama to California.

Trochus ligulatus MENKE, *Zeitschr. f. Mal.*, 1850, p. 173.—*Omphalinus ligulatus* CARPENTER, *Cat. Mazatlan Sh.*, p. 235.—*O. fuscescens*, CARPENTER, *Suppl., Rept. on Moll. W. Coast N. A.*, p. 652 (and of subsequent American collectors and authors, *not of Philippi!*).—*T. ligulatus* FISCHER, *Cog. Viv.*, p. 382, t. 115, f. 5.

Figs. 59, 60 are drawn from San Diego specimens. *C. ligulatum* differs from *C. reticulatum* and *C. viridulum* in lacking broad radiating stripes. It is usually encrusted with Bryozoa or *Serpula*.

C. CORONULATUM C. B. Adams. Pl. 24, figs. 80–83.

Shell umbilicate, more depressed and less conical than *C. reticulatum*; color dingy white, with broad radiating flames of brown or red above irregularly maculated below, sometimes nearly unicolored, pinkish, with the liræ of the base articulated with red and white dots. The spire is either conic or depressed; the sutures either simple, linear, or somewhat canaliculate. The whorls number about 5; they are spirally transversed by excessively minute spiral striæ; the last whorl has an acute carina at the periphery, and an angulation or keel at the middle of the upper surface of the whorl and continued upon the spire, and which is usually nodose on the last whorl; there is usually, too, a third ridge or carina, generally nodose, between the two already described. The base is more or less convex, generally shows microscopic concentric striæ under a lens, and has about 5 low, narrow, separated lirulæ. The aperture

is not notably different from that of *C. reticulatum*; the columella and inside of the umbilicus are either green or white.

Alt. 8-9, diam. 12 mill.

Tuboga, C. A. (C. B. Ad.); *Cape St. Lucas and La Paz, L. Cal.*

Trochus coronulatus C. B. AD., *Cat. Shells Panama*, p. 191, 317 (1852).—*Omphalius turbinatus* PEASE, *Am. Journ. Conch.*, v, p. 84, t. 8, f. 15.

This little species may be recognized by the close microscopically striated surface and the several keels of the last whorl, the upper one nodose. It is one of those species where the sculpture is very mutable because almost any one of the striae is likely to become magnified into a strong rib or carina. *Clanculus plebejus* is precisely comparable to this form in this respect. *Chlorostoma semigranosa* AD. is allied to this form but is much more coarsely lirated. Adams gives for alt. .55, diam. .72 inch.

Omphalius turbinatus is the adult of this species, as I have satisfied myself by an examination of the type specimens. The following is Pease's description :

Var. *TURBINATUM* Pease. Pl. 24, fig. 90.

Shell openly and deeply umbilicate, somewhat depressly turbinate, thick, solid; whorls angulate above, the last obsoletely angulate at the periphery, encircled by small slightly nodulous ridges, interstices elevately striate; base convex; smooth or obsoletely ridged, at the umbilical region smooth; columella at base nodosely dentate, and terminating in a very slightly elevated tooth (not grooved). Yellowish or whitish, radiately obliquely marked with reddish-brown interrupted stripes, the base marbled with reddish-brown. Umbilicus and columella sea green, operculum bright yellow.

Alt. 13, diam. 18 mill.

La Paz, Gulf of California.

C. SEMIGRANOSUM A. Adams. Pl. 29, figs. 65-67.

Shell umbilicate, conical, about the size and shape of *C. reticulatum* Wood; whorls of the spire but slightly convex, the sutures linear, not impressed; coloration consisting of radiating irregular divaricating flames, fine lines and dots of umber almost covering a whitish ground, sometimes entirely covering it except for small dots of white on the liræ; whorls 5 to 6, encircled by very numerous close irregularly crenulated spiral liræ, about 10 to 12 on the last whorl above the periphery, the interstices narrow, spirally striate

or smooth; the periphery is obtusely angular; and there is a slight prominent carina or angulation on the middle of the upper surface of the whorls; on some specimens there is a subsutural row of rounded grains; base slightly convex, bearing about 8 concentric crenulated liræ similar to those of the upper surface, but more separated, dotted with white, the interstices microscopically spirally striate; aperture oblique, outer lip *slightly* crenulated, or smooth within; columella short, arcuate, with a heavy white callus above, connecting with a pearly callus which coats the parietal wall; umbilicus rather large, deep, its edge formed by a spiral rib which terminates in a tooth at the base of the columella; immediately below this is a smaller one, and a third denticle is situated at the junction of columella with the base; basal margin thickened within, smooth. Alt. 12, diam. 16 mill.

West Indies (A. Ad.).

Phorcus semigranosus A. AD., *P. Z. S.*, 1851, p. 157.

This species may be known by the close, crenulated liræ, the color—which is a little too dark for umber but is more of a bistre shade, the obtuse carina on the middle of the upper surface of each whorl, etc.

C. QUADRICOSTATUM Wood. Pl. 28, fig. 49.

Shell umbilicate, conical, solid, thick, blackish; spire conoidal, apex rather blunt, sutures canaliculate; whorls 6, encircled by 4 coarsely tuberculose ribs on the upper surface; the upper two contiguous, sometimes coalescent; base with 3 or 4 separated smaller beaded ribs, the broad interstices both above and below densely, finely spirally striate; periphery obtusely angular; base nearly flat; aperture oblique, smooth within, columella sinuous, oblique, bidentate; umbilicus surrounded by a white callus, bearing inside a strong spiral rib which terminates in a denticle about the middle of the columella. Alt. 23, diam. 25 mill.

Coast of Chili.

T. quadricostatus WOOD, *Ind. Test. Suppl.*, t. 5, f. 16.—PHILIPPI, *Conchyl. Cab.*, p. 154, t. 25, f. 6.—FISCHER, *Coq. Viv.*, p. 104, t. 31, f. 2.—*T. torulosus* PHIL., *Abbild.*, i, Trochus, t. 2, f. 12.—*Monodonta catenifera* POT. ET MICH., *Galerie des Moll.*, i, t. 29, f. 12, 13 (not *T. catenifera* Kiener, also a *Chlorostoma*).

This species is allied to *C. coronulatum*. The large size, somber color and strong beaded spiral ribs at once characterize it.

C. RUBROFLAMMULATUM Koch. Pl. 29, figs. 57, 61, 62.

This form is similar in general appearance and form to *C. quadricostatum*. The spire is either elevated or rather depressed; the sutures deeply canaliculate; the last whorl encircled by three prominent, equidistant carinæ, *one* subsutural, composed of rounded or radiating knobs followed by two or three beaded lirulæ, *two* at the periphery, prominently beaded, with a beaded riblet between them; base encircled by 5 more or less beaded, equal liræ; the entire surface microscopically obliquely striate, and in some places decussated by microscopic spiral striæ. Aperture oblique, rounded-quadrate; outer lip thick, *lirate within*; columella less deeply sinuous than in *C. quadricostatum*, arcuate, tridentate below; umbilicus narrower than that of *C. quadricostatum*. Color whitish, radiately striped above with pink, the ribs of the base dotted or articulated with pink. Alt. 15, diam. 18; alt. 22, diam. 21 mill.

Panama; Gulf of California.

Trochus rubroflammulatus KOCH, in PHILIPPI, *Abbild.*, i, *Trochus* t. 2, f. 4.—*Conchyl. Cab.*, p. 186, t. 28, f. 17.—FISCHER, *Cog. Viv.*, p. 250, t. 85, f. 1.

The light coloration, complete coalescence of the two subsutural ribs into one series of tubercles, the equal liræ of the base and the lirate interior of the aperture at once separate this form from *C. quadricostatum*.

C. MELALEUCOS Jonas. Pl. 63, figs. 1, 2.

Shell rather solid, conical, apex obtuse, profoundly umbilicated, white ornamented with oblique black flammules; whorls 6, with a coronal series of tubercles, carinated, the carina nodulose; channelled below the carina, and spirally bistriate; last whorl bicarinate; base concentrically sulcate; aperture subrhomboid, *fauces smooth*; columella arcuate; terminating in two teeth. (*Phil.*)

This species, closely allied to *T. quadricostatus* Wood and *T. rubroflammulatus* Koch, is readily recognized by its very peculiar characters. It consists of 6 whorls, which are divided by a nodose keel into a larger convex upper portion and a smaller channelled lower part; a second series of blunt tubercles adorns the upper edge of the whorls along the suture; below there are slightly elevated striæ; the last whorl has the base sharply separated by a second

keel; the base is concentrically, rather deeply furrowed, the 6 furrows narrower than the intervening ridges. In the umbilicus, which perforates almost to the apex, all of the whorls are visible, encircled by an acute carina; the aperture is subquadrate, nacreous, smooth within, and has a groove indicating the place of the external keel; the columella is S-shaped, and ends in a blunt tooth, before which there is a small acute denticle; above, the columellar plate is callous, and covers a small portion of the umbilicus. The pretty markings of the shell consist of oblique, regular wide black streaks, separated by spaces as broad as themselves, on a white ground.

Alt. 24, diam. 25 mill. There are also narrower forms. (*Philippi*.)
Coast of Peru.

T. melaleucos JONAS, Zeitschr. f. Mal. 1844, p. 169.—*PHILIPPI* Abbild. u. Beschreib., ii, *Trochus*, t. 6, f. 7; and Conchyl. Cab., p. 185, t. 28, f. 16.

Evidently closely allied to *Chlorostoma rubroflammulatum*.

C. FUSCESCENS Philippi. Pl. 61, figs. 42, 43.

Shell depressed-conical, narrowly umbilicate, acute, brown; whorls densely spirally striated; nearly flat, subangulate at the sutures; last whorl subangular at the periphery; columella sub-excised, base bidentate, above produced in a short lobe partly impinging upon the umbilicus. (*Phil.*)

The shell consists of 5 to 6 whorls, and has a great likeness to the Mediterranean *T. (Gibbula) varius* in size, form of the whorls, striation and coloration; the whorls are almost entirely flat, only convex above near the suture; the last whorl is pretty angular, almost margined; the aperture is rounded-quadrangular, the columella strongly excavated, with two denticles below, separated by a nacreous depression, above produced into a callous which lies partly around the umbilicus, but is not so conspicuous as in other species. The umbilicus is narrow, white, distinctly bounded by a blackish band, which goes to the lower tooth of the columella, on others the color is brown, marbled with a few lighter flecks. There seems to be a variety in which there are separated elevated, carina-like lines.

Alt. 11, diam. 14 mill. (*Philippi*.)

Chili.

T. fuscescens PHIL., Abbild., etc., i, *Trochus*, t. 3, f. 8. (1884.)
(Not *Omphalius fuscescens* Carpenter et auct., = *Chlorostoma ligulatum* Mke.)

This seems to be a form perfectly distinct from the Californian shells called *fuscescens* by Cpr. and other American authors and collectors. See *C. ligulatum*.

C. SMITHII Tapparone-Canefri. Pl. 24, figs. 100, 101.

Shell globose-conoidal, thick, rather smooth, obscurely transversely striate-lirate, the liræ more evident on the base; whorls $6\frac{1}{2}$, terete; the penultimate inflated, convex, the last rotund, subcarinated; base somewhat convex; aperture suborbicular, lip much thickened within; subdenticulate within; columella sinuate, white, continued above in a lobe partly surrounding the umbilicus, and at the base bearing three obvious tubercles; throat smooth, silvery; shell green, flam-mulate with white; base around the umbilicus pale, purple flam-mulate. Alt. 27, diam. 26 mill. (*Tap.-Can.*)

Peru.

Omphalius smithii TAP.-CAN. Viaggio della R. Fregata 'Magenta' (Malacologia) p. 62, t. 1, f. 13.

This species is allied to *O. viridulus* Gmel., but is distinguished by (1) its larger dimensions; (2) its almost smooth surface, the cinguli almost obliterated; (3) the three very pronounced tubercles at base of columella; (4) the smooth and thick lip; (5) the convex base, the angle scarcely noticeable; (6) the umbilicus is less covered by a more extended callous. (*Tap.-Can.*)

C. PANAMENSIS Philippi. Pl. 61, figs. 11, 12.

Shell globose-conoidal, umbilicate, solid, *transversely sulcate*, purplish, marbled with white spots; whorls convex, the last rounded; transverse sulci about 10 on penultimate, 24 on the last whorl; umbilicus narrow; aperture circular; columella produced above in a lobe partly surrounding the umbilicus, below terminating in three denticles; lip very smooth within, with a basal sulcus parallel to the margin. (*Phil.*)

The shell is thick, globose, conoidal. The 5 to 6 whorls are separated by a deep suture, the upper ones slightly, the penult. and last strongly convex. The circumference is indistinctly angled; the base rather convex; the whole upper surface is densely furrowed by blunt transverse sulci, of which I count 10 on the penult., about 24 on the last whorl, including the base. The umbilicus is rather narrow, nearly cylindrical, encircled by a carina, above which a more prominent spiral rib revolves, which ends at the columella in three denticles. The aperture is very oblique, circular; the outer

lip is thickened within, and this thickening where it unites with the columella, leaves a deep furrow resulting from the continuity of the margin of the outer lip with the border of the umbilicus. Above the columella is continued in a lobe partly surrounding the umbilicus. The color is brownish-red, almost wine-colored, with white flecks. Alt. 15, diam. 19 mill. (*Philippi*.)

Panama.

T. panamensis PHIL. Zeitschr. f. Mal. 1848, p. 127; Conchyl. Cab., p. 311, t. 44, f. 15.

C. COOKSONI Smith. Pl. 60, figs. 12, 13.

Shell deeply umbilicated, suborbicular, slightly conoidal, brown, variegated with rosy, painted with white lines articulated with black; whorls $4\frac{1}{2}$, nearly smooth, slightly convex, sculptured with few delicate spiral striæ; last whorl convex above, slightly depressed beneath the suture, at the periphery flattened and biangulate; base nearly flat, delicately spirally striate, around the umbilicus encircled with a shallow groove; umbilicus white, deep, surrounded by white callus forming a tooth at the base of the columella; aperture suborbicular; columella arcuate, joined to the whorl by a callus.

Alt. 4, diam. 8 mill. (*Smith*.)

Charles Id.; Galapagos.

This shell is deeply umbilicated, elevately orbicular, convex above, only slightly conical, and flat beneath; the last whorl is flattened at its middle, and this produces a double angulation, which, however, is not very conspicuous. There is also a faint depression a little below the suture. The coloration of this species is not very definite; the upper surface is blotched irregularly with pink and brown, and some spiral articulated lines; the base is a trifle paler; the only sculpture consists of fine spiral striations, which are most conspicuous on the base; the callus which surrounds the umbilicus is whitish, and terminates in a faint tooth on the columella, and is bordered by a shallow sulcus on the whorl. The columella terminates above in a callosity which extends upward some distance on the whorl, and also spreads out within the aperture. *T. occultus* of *Philippi* bears a faint resemblance to this form, but is more conoid, and more strongly sculptured. (*Smith*.)

Charles Id., Galapagos.

Tr. (Omphalius) cooksoni SMITH (in Günther, Zool. coll. H. M. S. 'Peterel'), P. Z. S. 1877, p. 71, t. 11, f. 7.

C. MACULOSTRIATUM C. B. Adams. Pl. 24, figs. 88, 89.

Shell umbilicate, conical, solid, deep green, brown, pinkish or olivaceous, more or less dotted with white and a self-color, sometimes radiately flammulate with white; a tract around the umbilicus white, tessellated with brown. The spire is elevated, sometimes scalariform; the apex acute; upper whorls slightly convex, the last convex, depressed below the suture, rounded at the periphery; the whole surface bearing numerous low, smooth spiral striæ, which are often subobsolete on the last whorl, and it is then nearly smooth; base concave in the middle; aperture rounded-quadrate, smooth within or finely lirate; columella slightly sinuous, bidentate at base, expanding in a callus above, which slightly impinges upon the umbilicus. Alt. 9, diam. 10 mill.

West Indies generally.

Trochus hotessierianus D'ORB., *Moll. de Cuba*, ii, p. 59, t. 18, f. 15-17 (1853).—PHILIPPI, *Conchyl. Cub.*, p. 270, t. 39, f. 15.—*T. occultus* PHILIPPI, *Abbild. u. Beschreib.*, ii, *Trochus* t. 6, f. 8 (1845), and *Conchyl. Cub.*, p. 156, t. 25, f. 8.—*Monodonta maculo-striata* C. B. ADAMS, *Proc. Bost. Soc. N. H.*, 1845, p. 6.—*T. maculo-striatus* PHIL., *Conchyl. Cub.*, p. 120, t. 28, f. 7.—FISCHER, *Cog. Viv.*, p. 254, t. 86, f. 1.

This species when fully developed is elevated, finely, regularly spirally striate, with much smoother surface and more regular smooth sculpture than *C. scalaris*, as well as narrower umbilicus. The fully developed form is *T. hotessierianus* of d'Orb. Younger shells are less elevated, and more conspicuously sculptured; and I at first drew up a description of them under the name of *T. occultus* Phil.; the same form is the *M. maculo-striata* of Adams. These two names were both proposed in 1845, and as far as I know there is no means by which the priority of either may be proven. The description of *T. occultus* Phil.=*maculo-striatus* C. B. Ad., is as follows: (Pl. 24, figs. 84, 85).

Shell small, umbilicate, depressed conical, dark olive-brown (bistre) or umber colored, dotted more or less with white, especially beneath; whorls slightly convex; suture impressed; apex acute, leaden or whitish; whorls 5, moderately convex, spirally finely lirate, the liræ 8 to 12 in number on the penultimate whorl, smooth, narrower than the interstices, which under a strong lens appear obliquely striate, often with a central spiral riblet; there are often one or two more prominent liræ about the middle of the whorl

above, and these are articulated with white; the periphery is obtusely subangular, and bears two more conspicuous liræ articulated with white, between which there are several lirulæ; the base is rather flattened, concave in the middle around the umbilicus, and white, with about 6 rather strong concentric liræ articulated with dark spots; the outer part of the base is encircled by a zone of very minute spiral ribs; aperture oblique, rounded-quadrate; columella sinuous, arcuate; umbilicus white within, bordered by a strong spiral rib which terminates in a tooth at the base of the columella, beneath which is another smaller similar denticle.

Alt. 7, diam. 8 mill.

C. IMPRESSUM Jonas. Pl. 63, figs. 8, 9.

Shell narrowly and profoundly perforate, rather thick, conoid, dull cinereous, ornamented with castaneous radiating flammules; whorls 6, rather convex, spirally finely lirate, the liræ 7 to 8 on the penultimate whorl, 5 on the preceding; last whorl rounded, compressed below the suture above, somewhat convex beneath, and provided with about 10 concentric liræ; aperture slightly dilated, ovate, the lip plicatulate within; columella thin in the middle, arcuate, concave, bearing 2 or 3 tubercles below; columellar callus thick, green, slightly impinging upon the umbilicus.

Alt. 13, diam. 13 mill. (*Fischer*.)

W. coast S. America (?) ; Mazatlan (?).

Trochus impressus JONAS, in PHILIPPI, *Conchyl. Cab.*, p. 318, t. 45, f. 6.—FISCHER, *Coq. Viv.*, p. 252, t. 85, f. 2.—*T. corvus* PHIL., *Zeitschr. f. Mal.*, 1849, p. 152. (Error).

C. SCALARE Anton. Pl. 29, figs. 70–73.

Shell broadly, deeply umbilicated, conical, white, nearly unicolorous, (1) articulated on the ribs with reddish or olive-brown dots, (2) tinged with pinkish or olive all over and dotted with a darker self-color on the ribs, (3) with broad radiating pinkish, olivaceous or yellowish maculations above, maculated or speckled on the base. Spire generally elevated, sometimes scalariform, pointed, conical, the apex acute; sutures deeply marked; whorls 6 to 8, quite convex, obliquely striate, spirally lirate, the liræ generally rather low, but sometimes elevated, cord-like, and numbering from 7 to 12 on the penultimate whorl. The liræ are rather irregularly, slightly crenulated; they are unequal in size, one or two about the middle of the upper surface generally being larger, causing a slight

carina there. The periphery is sometimes rounded but usually carinated; the base is convex, broadly concave around the umbilicus. Aperture oblique; columella sinuous; more deeply receding above than in any other species, and angulated at its junction with the white callus upon the whorl, strongly unidentate below; umbilicus broad, deep, with two spiral ribs within; one terminating in the callus of the columella at its junction with the body-whorl, the other ending in the basal tooth of the columella.

Alt. 14–17, diam. 18–22 mill.

West Indies generally; Florida Keys (Simpson).

T. scalaris ANTON, in PHILIPPI, *Abbild.*, i, Trochus, t. 4, f. 11 (1844).—PHILIPPI, *Conchyl. Cab.*, p. 182, t. 28, f. 11.—FISCHER, *Cog. Viv.*, p. 253, t. 85, f. 3.—*T. canaliculatus* D'ORB., *Moll. de Cuba*, t. 18, f. 18, 19.—PHILIPPI, *Conchyl. Cab.*, p. 227, t. 34, f. 14.—*Monodonta livido-maculata* C. B. ADAMS, *Proc. Bost. Soc. N. H.*, ii, 1845, p. 7 (teste Fischer).—*T. gundlachi* PHILIPPI, *Zeitschr. f. Mal.*, 1848, p. 108, and *Conchyl. Cab.*, p. 226, t. 34, f. 13.

I do not quote *Globulus indusii* CHEMNITZ, *Conchylien Cabinet*, v, p. 116, f. 1682, because the figure is unidentifiable and because Chemnitz says of his shell, *Er wird wiederum von dichte aneinander sitzenden Perlenreihen umgeben*; and the granulation of the liræ of this species is never obvious enough to justify such a term as "Perlenreihen."

In general, this form may be recognized by the broad umbilicus, strongly 2-ribbed within, the low, irregular, cord-like liræ, the acutely pointed spire, and especially by the very deep angular sinuosity of the columella. There are sometimes two spiral ribs instead of one at the margin of the umbilicus. Pl. 24, figs. 86, 87 are *T. gundlachi* Phil., a form which seems to be synonymous, corresponding with immature specimens of the *C. scalare*.

C. FASCIATUS Born. Pl. 29, figs. 74–77.

Shell umbilicate, depressed, thick and solid; *smooth*; ground-color yellowish, elegantly painted with red, black or brown in innumerable patterns, usually some combination of spiral rows of dots or blotches, and radiating irregular flames; whorls about 6, the apex acute, upper whorls nearly flat, the last flattened beneath the suture, convex, rounded, descending; base rounded, concave around the umbilicus; aperture oblique, outer lip finely crenulated within;

columella short, arcuate, with a white callus above and two transverse tubercles at base. Alt. 14, diam. 16 mill.

West Indies; Florida Keys; Bermuda.

T. carneolus LAM., *An. s. Vert.*, vii, p. 29.—FISCHER, *Coq. Viv.*, p. 195, t. 63, f. 2.—*T. fasciatus* BORN, *Mus. Cæs. Vindob.*, p. 331, t. 12, f. 3, 4.—*T. dentatus* GMEL., *Syst. Nat.*, xiii, p. 3601.

An abundant West Indian species, differing from other *Omphalius* by the smooth surface. The name imposed by Born had better be retained, as there is no doubt about the identity of his figures and description with the present species.

C. SUBSTRIATUM Pilsbry. Pl. 29, figs. 78.

Much more depressed than *C. carneola*, discoidal, widely umbilicate; surface sculptured by numerous spiral slightly elevated lirule, which are red, more or less articulated with white dots; periphery frequently with two or several more prominent liræ.

Alt. 6, diam. 10 mill.

Bahamas; St. Croix.

C. EXCAVATUM Lamarek. Pl. 63, figs. 3, 4, 5.

Shell umbilicate, conical, dull grayish, olivaceous or pinkish, longitudinally lineolate with a darker shade, frequently appearing unicolored; spire conic, apex eroded or acute; whorls 6 to 7, flattened, scarcely convex, very obsoletely spirally grooved; body-whorl acutely carinated at the periphery, flat or plano-concave beneath, concentrically lirate; aperture large, subhorizontal, iridescent within; columella sinuous, unidentate in the middle, green, half surrounding the umbilicus with a sickle-shaped callus; umbilicus infundibuliform, green or white within, broadly expanding at its opening.

Alt. 12-14, diam. 15 mill.

West Indies.

T. excavatus LAM., *An. s. Vert.*, vii, p. 29.—PHILIPPI, *Conchyl. Cab.*, p. 151, t. 25, f. 1; t. 28, f. 12.—FISCHER, *Coq. Viv.*, p. 283, t. 92, f. 3.

Distinct from all other West Indian species in the conical form, flat base and more oblique aperture.

C. CRUENTUS Philippi. Pl. 63, figs. 6, 7.

The present species is very distinct in its sculpture. There are 7 whorls, ending in an acute apex, and very convex. The upper ones have 6 concentric liræ, which appear quadrate in section, often above

divided by a sulcus, and broader than the interstices. The last whorl has 15–16 such liræ, and is almost cylindrical. The umbilicus is pretty narrow, almost cylindrical, bounded by a prominent sharp carina, which resembles a tooth-like projection of the columella. Columella rather deeply excavated, but showing no trace of a continuation around the umbilicus. The aperture is somewhat rhomboidal, the outer lip thickened within, sulcate from the margin inward, corresponding to the liræ of the exterior. One of my examples is dark red, the other dark ashen-gray, both sprinkled with white dots. Alt. 11–13, diam. 14–16 mill. (*Philippi*.)

Habitat unknown.

T. cruentus PHIL., Abbild. u. Beschreib., i, Trochus, t. 4, f. 4; Conchyl. Cab., p. 157, t. 25, f. 10.

A species of uncertain generic position. May be a *Gibbula*.

C. SORDIDUM Philippi. Pl. 61, figs. 7, 8.

Shell depressed-conoidal, narrowly umbilicate, transversely striate, obliquely plicate, brown; whorls depressed, carinated just above the sutures, the last bicarinated; aperture rhombic-orbicular; columella oblique, toothed in the middle, continued above in a lobe partially surrounding the umbilicus. (*Phil.*)

The shell is pretty thin, depressed-conoidal above, consisting of 6 whorls. The uppermost are level, with an elevated keel just above the suture, below the keel perpendicular. The last whorl has a second keel around the periphery. The base is plano-convex. The part of the whorl above the keel shows about 6 elevated transverse lines, and closely crowded growth striæ, under a lens appearing lamellar; and on the last whorl are oblique wave-like folds meeting the incremental lines at right angles. The part between the keels has 4 furrows; the base has smooth, close, concentric striæ. The aperture is broader than high, rhombic-circular; the outer lip thin; the throat smooth; the columella is oblique, with a tooth in about the middle, and above is prolonged in a lobe partly around the umbilicus. The umbilicus is narrow, cylindrical, not definitely bounded. The color is dirty brown, somewhat tinged with green.

Alt. 9, diam. 12 mill. (*Philippi*.)

Habitat unknown.

T. sordidus PHILIPPI, Zeitschr. f. Mal., 1849, p. 191; Conchyl. Cab., p. 301, t. 44, f. 1.

C. SUBFUSCESCENS Schrenck. Pl. 41, figs. 18, 19, 20, 21.

Shell small, depressed-conoidal, narrowly umbilicated, brownish-black, unicolored or marbled with dull white, encircled by slightly elevated lines, densely decussated by oblique striæ; whorls 4, planulate, the upper subangular at the suture, the last bicarinate at the periphery, transversely costulate-plicate above; base nearly flat, very minutely closely striate; aperture rhomboidal, columella arcuate, with two small teeth separated by a little pit below, above produced into a lobe partly covering the umbilicus; lip acute, brown-margined; fauces pearly, white.

Alt. 7, diam. 10 mill; alt. 5, diam. 7 mill. (*Schrenck.*)

Bay of Hakodadi, Japan.

T. subfuscescens SCHRENCK, Bull. de l'Acad. Imp. des Sci. de St.-Petersb., v, p. 512; Moll. des Amur-landes, etc., p. 350, t. 15, f. 3-10.

This species is evidently closely allied to *Trochus sordidus* Phil.

C. PFEIFFERI Dohrn. Pl. 61, figs. 28, 29.

Shell umbilicate, conical with concave base, solid, lusterless, dark blackish or purplish slate-colored, with spiral series of white dots; spire conoidal, apex blunt, sutures subcanaliculate; whorls about 5, convex, the last subangulate at periphery, and with a decided angle in the center of the base; the sculpture consists of narrow inconspicuous spiral riblets (about 6 on penult. whorl) articulated with white dots. The whole surface has oblique growth lines; and a lens shows fine, subobsolete spiral striæ all over the upper surface. Inside of the angle on the base the color is greenish, with radiating dull reddish stripes, and the surface smooth, save for five growth-lines. Aperture large, occupying one-half the area of base, subhorizontal, pearly within, with red and green reflections, the nacre either almost smooth or bearing fine white opaque plicæ; outer lip thin, bordered within by an opaque white band about $1\frac{1}{2}$ or 2 mill. wide; columella very oblique, straight, white, opaque, continued in a callous lobe about $\frac{1}{2}$ around the umbilicus.

Alt. 10, diam. 12 mill.

New Hebrides.

Omphalius pfeifferi DOHRN, Malak. Bl. 1864, p. 56.

This shell seems to be a true *Chlorostoma*, or rather, *Omphalius*. Its distribution is very different from that of any other species, and its characters also are distinct. The dark coloration, white-dotted narrow liræ, concave base, etc., are diagnostic.

C. CANUS Koch. Pl. 61, figs. 14, 15.

Shell small, umbilicated, globose-conoidal, solid, smooth, gray; whorls nearly flat, depressed above, the last rounded; aperture narrow within; columella arcuate, with an acute basal denticle and a deep sulcus below; umbilicus narrow. (*Phil.*)

The shell is globose-conical, somewhat depressed, and consists of 5 to 6 whorls; the superior ones are flat, especially at the suture; the last is well rounded at the periphery; all are smooth; the shell is very thick, so that the aperture appears small within; it is circular: the concave columella ends in a sharp tooth, bounded by a deep furrow which is parallel with the outer lip. The inner lip is thickened, especially toward the umbilicus, which is very narrow but perforating. The color is gray, without markings. The neighborhood of the umbilicus is white. Alt. 7, diam. 9 mill. (*Philippi*.)

West Indies.

T. canus KOCH, Zeitschr. f. Mal. 1848, p. 102; PHILIPPI, Conchyl. Cab., p. 181, t. 28, f. 9.

C. OMPHALIUM Philippi. Pl. 61, figs. 5, 6.

Shell umbilicated, conoidal, granose, painted with deep purple flames; whorls slightly convex, the last angulated at the circumference, with 5 to 6 granuliferous cinguli, slightly narrower than the interstices; base rather flattened, with 5 slightly elevated cinguli articulated with purple; aperture rounded-rhombic; columella cut out, produced into a green lobe partly surrounding the umbilicus, below denticulate; lip where it passes into the columella, simple. (*Phil.*)

The shell is depressed conoidal, consisting of 6 whorls, of which the upper ones are scarcely convex, the last angular at the periphery and flat beneath; last whorl showing 5 to 6 rows of flat, rather distant granules, which are narrower than the interstices; the base shows 5 or 6 very slightly elevated, smooth, concentric liræ, without granules. The umbilicus is cylindrical in each whorl, with a white spiral keel within. The aperture is somewhat depressed, rhombic-circular; the columella excavated, prolonged in a green lobe above, partially surrounding the umbilicus. The basal mar-

gin is simple, and at its junction with the columella there is a denticle, terminating the ridge which bounds the umbilicus. The throat has the appearance of being corrugated, but is smooth. The color is a dirty pale green, with broad purple-red stripes above, the base brownish, with the liræ articulated with white and purple-brown. The columella is greenish, and the aperture has greenish nacre. Alt. 10, diam. 14 mill. (*Philippi*.)

Habitat unknown.

Distinguished from *T. viridulus* by the much smaller size, more depressed form, simple basal lip, and the green umbilicus-bounding lobe of the columella, a feature approaching *T. excavatus* Lam. (*Phil.*)

T. omphalium PHIL., Zeitschr. f. Mal., 1848, p. 110; Conchyl. Cab., p. 270, t. 39, f. 16.

C. GRUNERI Philippi. Pl. 61, figs. 1, 2.

Shell small, umbilicate, depressed, transversely striate above, smooth beneath; white and scarlet spotted, shining; last whorl rounded, encircled at the periphery with two more elevated lines; umbilicus similarly encircled; aperture suborbicular, throat silvery, lip lightly sulcate within. (*Phil.*)

This small species, notable for its beautiful red color, is very much depressed, and consists of 5 whorls which rapidly widen. The upper ones are but slightly convex, the last nearly cylindrical. The upper surface is transversely [*i. e.* spirally] striate but shining, the base smooth. Around the circumference of the last whorl there are two elevated stronger lines or lirulæ, reminding one of a similar formation in *T. maculostriatus*. The umbilicus is pretty broad, and would pass imperceptibly into the base were it not bounded by two rounded liræ close to one another. These do not terminate in denticles. The aperture is circular inside; the outer lip has little liræ within; the columella is not excavated, but is produced in a little continuation, partly surrounding the umbilicus. On a white ground there are bright red spots, or the shell is white and red marbled; the transverse lines are often white and red articulated.

Alt. 6, diam 9½ mill. (*Philippi*.)

Antilles.

T. gruneri PHIL., Zeitschr. f. Mal., 1848, p. 107; Conchyl. Cab., p. 183, t. 28, f. 13.

C. SCABRICULUM v. d. Busch. Pl. 61, figs. 16, 17, 18.

Shell depressed-conic, umbilicate, pale reddish, marbled with white and brown spots, sculptured with frequent rugose transverse cinguli, the middle of the upper surface angulated; last whorl subangulate, submarginate; aperture suborbicular within; columella denticulate at the outer basal portion, produced in a callous partly surrounding the umbilicus above. Umbilicus moderate, terete. (*Phil.*)

The shell is depressed-conoidal, pretty thick, and consists of $5\frac{1}{2}$ whorls. These are very regularly convex, sometimes somewhat angular in the middle, the last one at the periphery often much more distinctly carinate than in the figure, and slightly margined. On the upper surface of the penultimate whorl one sees 6 to 8 liræ, separated by narrow interstices, and irregularly uneven and wrinkled, not regularly granulose. This is especially true of the upper ones, and the middle one, which sometimes makes the whorl angular. The last whorl has above numerous spiral liræ; the flat base has 10, which are smooth, regular, and separated by deep narrow interstices. The umbilicus is moderate, and in each whorl is cylindrical. The aperture is circular within; the columella has at the outer base a little pit, as if something had been broken off, and three little denticles; above it is continued in a callous which surrounds one-third of the umbilicus. The basal lip has within a broad, rather deep furrow, parallel with its edge. The furrow is clear reddish-brown, marbled with dark brown and white dots; the base lighter, regularly marked, the umbilical tract white.

Alt. 9, diam. 14 mill., generally smaller.

West Indies.

T. scabriculus (v. d. Busch in litt.) PHIL., Zeitschr. f. Mal. 1848, p. 125; Conchyl. Cab., p. 178, t. 28, f. 5.

C. PATAGONICUS d'Orbigny. Pl. 13, figs. 88, 89.

Shell orbiculate-conic, thick, umbilicate, transversely narrowly granulose-sulcate, uniform brownish or purplish; spire conic, apex obtuse; whorls 5, subcarinate; sutures excavated; aperture rounded; columella bidentate. Alt. 11, diam. 14 mill. (*Orb.*)

Bay of San Blas, Patagonia.

T. patagonicus ORB., Voy. dans l'Amér. Mérid., p. 408, t. 55, f. 1-4.—PHILIPPI, Conchyl. Cab., p. 225, t. 34, f. 12.

C. CORRUGATUM (Koch) Philippi. Pl. 41, figs. 34, 35.

Shell orbicular-conoid, umbilicated, dull flesh-colored; whorls rather convex, transversely sulcate, roughly reticulated by impressed

oblique irregular squamose lines; aperture rounded-rhombic columella marked with a granule outside. (*Phil.*)

This species is very distinct in sculpture. The 6 whorls are slightly convex, and have about 9 impressed spiral lines, which are so intersected by irregular impressed longitudinal lines, that the result is an irregular network, very difficult to render in the illustration. The aperture has nothing distinctive; the inner lip is smooth inside. The columellar margin has a nacreous depression below, and over it a white, blunt outward-projecting tooth. The umbilicus is narrow, almost cylindrical, and is bounded by a rather acute angle; within this angle is a slight ridge, which ends in the denticle of the columella. The color is a dirty flesh-tint; aperture and umbilical region not colored; the former has an inferior kind of nacre.

Alt. 12, diam. $15\frac{1}{3}$ mill. (*Philippi.*)

Brazil.

T. corrugatus KOCH in PHILIPPI, Abbild., i, *Trochus*, t. 2, f. 7; and PHIL. Conchyl. Cab., p. 157, t. 25, f. 9.

Unfigured Chlorostoma and Omphalius.

C. CASTANEUM A. Adams. C. testa oblique conica, umbilicata, castanea; anfractibus planis, longitudinaliter obsolete nodoso-plicatis et oblique striatis, penultimo infra marginato, ultimo acut-angulo, basi concavo, pallide fusca, lineis viridi-fuscis radiatim picta; umbilico infundibuliformi, perspectivo, intus albo, linea elevata cincto; apertura subrhomboidea; columella supra sinuata, basi dente terminata. (*A. Ad.*)

Habitat unknown.

P. Z. S., 1851, p. 182.

C. TURBINATUM A. Adams. C. testa turbinata, profunde umbilicata, nigra, spira obtusa, longitudinaliter subplicata, transversim sulcosa; anfractu ultimo rotundato, regione umbilicali partim callo lutescente oblecta; columella antice bituberculata; labro nigro marginato. (*A. Ad.*)

Habitat unknown.

L. c., p. 182.—SMITH, *Ann. and Mag, N. H.*, 1875, p. 112.

Mr. E. A. Smith has indentified this species with specimens received by him from Toba, S. Nippon, Japan. With it he unites the *Chlorostoma rugatum* of Gould, observing that the latter differs only in being more finely lirated on the base.

C. MACULOSUM A. Adams. *C.* testa conica, profunde umbilicata, viridi-fusca, maculis nigro-fuscis ornata; anf. planulatis, longitudinaliter substriatis, transversim striatis; anfractu ultimo angulato, basi concavo; columella antice tuberculo acuto terminata. (*A. Ad.*)

Habitat unknown.

L. c., p. 183.

C. SEMINODOSUM A. Adams. *C.* testa depresso-conica, profunde umbilicata, fusca; anf. planulatis, superne subnodosis, longitudinaliter oblique striatis; anfractu ultimo angulato, supra angulum cingula transversa elevata ornato, basi planiuscula; columella tuberculis duobus, supremo acuto, prominente. (*A. Ad.*)

Habitat unknown.

L. c., p. 183.

C. ARTICULATUM A. Adams. *C.* testa orbiculato-conica, umbilicata, nigro-fusca, cingulis transversis elevatis albo-articulatis ornata; anfractu ultimo subangulato, basi cingulis albo-articulatis instructo, regione umbilicali viridi; columella tuberculo parvo terminata. (*A. Ad.*)

Habitat unknown.

L. c., p. 183.

C. TURBINATUM A. Adams. *C.* testa ovato-conoidea, imperforata, castanea, levi; longitudinaliter oblique striata, striis transversis indistinctis insculpta; anfractibus rotundatis, sutura anguste canaliculata, regione umbilicali impressa; labio curvato, basi dente et tuberculo terminata; labro intus sulcato. (*A. Ad.*)

Habitat unknown.

L. c., p. 183.

Mr. Adams preoccupied this name in *Chlorostoma* on the preceding page of the *Proceedings Zoöl. Soc.*

C. RUGATUM Gould. Testa solida, depressa, ovato-conica, fusco-nigra, striis incrementi lamellosis; anfr. 6, admodum convexis, posticis transversim striatis, anticis plicis ad suturam tuberculosi in undulas obliquas divaricantes desinentibus ornatis; basi convexo, spiraliter striato, regione umbilicali impresso, imperforato, albido; dente columellari acuto; apertura magna, rotundata; fauce argentata. Diameters about one inch. Closely allied to *C. nigerrima*. (*Gould.*)

Hakodadi Bay and Simoda, Japan.

Proc. Bost. Soc. Nat. Hist., viii. p. 20, 1861.

PHORCUS NODICINCTUS A. Adams. Testa conoidea, umbilicata, fusco luteo variegata, lævi; anfr. subplanulatis, cingulis tribus nodulosis, iris elevatis transversis ornatis, anf. ult. subangulato, basi convexiuscula, lineis elevatis concentricis sculpta, regione umbilicali albida; columella brevi, arcuata, basi dentibus duobus terminata; labro fusco marginato. (*Ad.*)

Habitat unknown.

P. Z. S., 1851, p. 157.

PHORCUS GRANIFER A. Adams. Testa orbiculato-conica, fusca, cingulis transversis granorum distantium ornata, cingulis remotiusculus, interstitiis transversim liratis; anfr. rotundatis, sutura canaliculata; umbilico aperto, perspective; columella sinuata, basi dentibus duobus terminata; labro intus crenulato. (*Ad.*)

Habitat unknown.

P. Z. S., 1851, p. 157.

PHORCUS LIRATUS A. Adams. Testa conoidea, umbilicata, fusca, lineis pallidis undulatis ornata, cingulis distantioribus transversis inculpta; columella sinuata, basi dentibus tribus terminata; umbilico aperto, perspective, peromphalo viridulo; labro intus lævi. (*Ad.*)

Habitat unknown.

P. Z. S., 1851, p. 157.

PHORCUS CALIFORNICUS A. Adams. Testa orbiculato-conica, profunde umbilicata, viridi, atro-purpureo radiatum maculata, iris transversis subnodulosis inæqualibus ornata; anfr. ult. subangulato; basi convexiuscula; umbilico perspective; labio in medio valde excavato; columella antice dentate, intus lævi. (*Ad.*)

California (Mus. Cuming.)

P. Z. S., 1851, p. 157.

Genus GIBBULA Risso, 1826.

Gibbula Risso, Hist. Nat. Eur. Mérid., iv, p. 134.—GRAY, Guide Syst. dist. Moll. Brit. Mus., p. 151 (1853).—H. and A. AD., Genera, i, p. 431.—FISCHER, Manuel de Conchyl., p. 823.—TROSCHEL, Das Gebiss, ii, p. 238.—*Phorcus* Risso, Hist. Nat. Eur. Mérid., iv, p. 133.—PHILIPPI, Handbuch der Conchyl., p. 210.—*Forskålia* H. and A. AD., Genera, p. 432 (1858).—*Magulus*, *Glomulus*, *Puteolus*, *Phorculus*, *Tunulus*, *Gibbulastra*, *Colliculus*, MONTEROSATO, Bull. Soc. Mal. Ital., 1888, p. 169–177.—*Steromphala* (LEACH, *mss.*) GRAY, P. Z. S., 1847, p. 146.—*Korenia* FRIELE (Type *T. cinerarius* Linn.)

Tungebevæbningen hos de Norske rhipidoglossa.—*Eurytrochus* FISCHER, Icon. Coquilles Vivantes, Trochus, p. 417 (1880).—*Calliotrochus* FISCHER, l. c., p. 418.

Gibbula (Leach mss.) Risso, is preceded by *Phoreus* Risso. The latter name has been used by A. Adams and writers on the shells of West America for the umbilicated *Chlorostoma*; but such use is of course inadmissible. The name *Gibbula* has been so uniformly selected by authors in preference to *Phoreus* that it would be inadvisable to insist on the priority of one page which the latter name has. The subdivisions of the restricted subgenus *Gibbula* are given on the following page. It will be noted that one author had added no less than seven synonyms to the homogeneous group inhabiting the seas of Europe. Such heaping up of names for groups without characters is highly undesirable. The time is at hand when such performances will bring their authors the discredit they merit.

The species of *Gibbula* are very numerous, and are nearly all littoral or laminarian in station. The group is distributed through all seas except upon the coasts of the Americas, which have not a single species.

The dentition of *G. declivis* is figured on Pl. 50, fig. 6; *G. tumida*, pl. 50, fig. 16. Both rhachidian and lateral teeth have well developed denticulate cusps; the body of the tooth has expanded lateral supporting-wings, and is narrowed toward the cusp. The outer laterals are wider. Radulæ of species of *Gibbula* have been figured by Troschel, Friele, Sars and Hutton.

Subgenus GIBBULA, restricted.

This division comprises most of the species. Owing to the fact that there are many forms which I have not seen, and on account of the intergradation of the various types of form, I have not attempted to distribute the species into their natural groups or sections, but have simply grouped the forms around certain types of shell-structure, which may be briefly indicated here,—this analysis to replace the partial division given on page 12 of this volume.

Section I. GIBBULA s. str. (including *Forskalia* Ads., *Magulus* Monts., *Colliculus* Monts., *Glomulus* Monts., *Puteolus* Monts., *Phoreulus* Monts., *Tumulus* Monts., *Phoreus* Risso, *Gibbulastra* Monts., *Steromphalus* (Leach) Gray, *Korenia* Friele and a number of other names). Shell nodulus or more or less tumid beneath the sutures; generally not much higher than broad, conical, umbilicate (rarely

subimperfurate), spirally striate or lirate, generally conspicuously painted with longitudinal stripes of red or brown. Species mostly of the European seas. (See remarks under *G. magus*.)

Section II. *EURYTROCHUS* Fischer. See definition on p. 12. This section includes *G. danieli*, *reevei*, *affinis*, *concinna*, *strangei*, *mystica*, and perhaps some other species. Its distribution is Australo-Pacific.

Section III. *CALLIOTROCHUS* Fischer. Small globose species, with rounded, smooth or spirally striate whorls; thin; aperture rounded, outer lip and columella simple, thin, arcuate; umbilicus narrow. Includes *G. phasianellus*, *G. tasmanica*, and perhaps some other forms not seen by me.

Section IV. *CANTHARIDELLA* Pilsbry. Small forms with much the aspect of tiny *Cantharidus*; usually polished, narrowly or not perforate; conical, elongated. *G. picturata*, *fulminata*, *nitida*, *stolitzkana*, *dupontiana*, *blanfordiana*, *tiberiana*, *yessoensis*, *callichrous*, and some other species belong here.

Section V. *CONOTROCHUS* Pilsbry. This type is quite distinct in the elevated narrow, turritid form, narrowly umbilicate base, tubular whorls, either striate or keeled. The shell is thin, minute, lusterless, with circular aperture, not modified in form by the parietal wall. The species are *mariei*, *holdsworthiana*, *subplicata*, *singaporensis*, *pantanellii*. All are from the northern shores of the Indian Ocean, Red Sea to Singapore.

A. Species Inhabiting European Seas.

G. MAGUS Linné. Pl. 30, figs. 8, 9, 10.

Shell widely, deeply umbilicate, low-conical, solid, whitish or yellowish, painted with zigzag radiating stripes, maculations or lines of pink or rich brown, sometimes so broken into minute flecks as to appear minutely mottled all over, or sometimes lacking markings; base radiately zigzag-striped; spire conical, apex acute; whorls 7 to 8, swollen, gibbous and radiately plicate beneath the sutures, and with a rim or flange at the periphery; entire surface spirally finely striate; base convex; aperture very oblique, rounded-rhomboid, smooth within; columella oblique, its edge straight or slightly convex in the middle, at its insertion reflexed slightly over the umbilicus; umbilicus bounded by a strong spiral rib.

Alt. 22, diam. 30 mill.

Mediterranean and temperate Atlantic Coasts of Europe; Azores.

T. magus LINNE., *Syst. Nat.*, xii, p. 1228 (1766).—PHILIPPI, *Conchyl. Cab.*, p. 18, t. 4, f. 1, 2.—FORBES & HANLEY, *Brit. Moll.*, t. 65, f. 6, 7.—JEFFREYS, *British Conch.*, iii, p. 305, t. 52, f. 1.—HIDALGO, *Mol. Mar. de Esp.*, t. 58, f. 3-6.—FISCHER, *Coq. Viv.*, p. 110, t. 35, f. 1.—BUQ. DAUTZ. ET DOLLFUS, *Moll. Mar. Rouss.*, p. 373, t. 44, f. 1-11.—*T. tuberculatus* DA COSTA, *Brit. Conch.*, p. 44, t. 3, f. 1, 2.—*T. majus* SÖWB., *Ill. Ind. Brit. Sh.*, t. 11, f. 19.—*T. bicarinatus* GRAY, in Griffith's Cuvier's Anim. Kingd., t. 1, f. 1.—*T. grayanus* PHIL., *Conchyl. Cab.*, p. 281, t. 41, f. 6.

An abundant species. There is great variation in color. A small white or cream colored variety is found on the Mediterranean coast of France.

The natural position of *G. magus* is between the group known as Forskalia (*G. declivis*, *fanula*, *guttadauri*, *fanuloides*) and the *G. albida* L. It is equally related to both the former and the last-named species, but being the type of the genus I have given it first place. The Mediterranean Gibbula, although they have been divided into numerous "subgenera," form a quite homogeneous group, in which species succeeds species so closely that only careful analysis enables us to discriminate them. Only in one place can I see a hiatus of super-specific value in the series; and that break, indicated by asterisks on p. 204, separates the species having acuminate, acute spires from those in which the outlines of the spire are more convex, not attenuated toward the apex. For the latter group the name *Phorcus* of Risso may be retained by those who can see any use in such trivial distinctions.

G. DECLIVIS Forskäl. Pl. 31, figs. 47, 48.

Shell umbilicate, conical, solid, whitish, maculated with purplish or yellowish; whorls about 6, bicarinate at the periphery, all over spirally lirate, the upper surface strongly radiately costate, the folds terminating at the periphery in short spines; periphery encircled by a channel bearing a median riblet; base convex, bearing 4 or 5 strong concentric liræ; aperture rounded, smooth within; columella sinuous, arcuate, dentate at the base; umbilicus moderate, deep.

Alt. 20-24, diam. 22-27 mill.

Red Sea; Gulf of Akaba.

Turbo declivis FORSKAL, *Descrip. animal.*, p. 126.—SAVIGNY, *Moll. de l'Egypt*, t. 3, f. 1, 2.—*Trochus declivis* PHILIPPI, *Conchyl.*

Cab., p. 229, t. 34, f. 17.—FISCHER, *Coq. Viv.*, p. 126, t. 43, f. 3.—*Trochus aegyptius* KIENER, *Species*, gen. *Trochus*, t. 43, f. 3.—*Monodonta aegyptiaca* LAMARCK, *An. s. Vert.*, vii, p. 33.

Type of the subgenus *Forškulia* H. and A. Adams. This species and the following are separated from all others by the scalariform spires, strongly plicate upper surface, and the deep channel encircling the periphery. These characters are only an exaggeration of those of *Gibbula magus*. It is inadvisable to give a subgeneric name to so slight a divergence.

G. *FANULUM* Gmelin. Pl. 63, figs. 10, 11.

Shell umbilicate or perforate, conical, solid, whitish, radiately maculated above, dotted beneath with red or rich brown; spire conical, acuminate, somewhat scalariform; whorls about 7, very convex, spirally lirate, radiately costate above, bicarinated at the periphery, and encircled by a deep canal; base convex, bearing about 5 spiral liræ; aperture oblique, rounded, columella sinuous in the middle (not concave, nor dentate at the base as in *G. declivis*), arcuate above; umbilicus broad and funnel-shaped, or narrow and almost closed. Alt. 15–19, diam. 14–17; alt. 14, diam. 15 mill.

Mediterranean and Adriatic Seas.

T. fanulum GMEL., *Syst. Nat.*, xiii, p. 3573.—PHILIPPI, *Conchyl. Cab.*, p. 228, t. 34, f. 16.—FISCHER, *Coq. Viv.*, p. 125, t. 43, f. 1.—BUQUOY, DAUTZ. ET DOLLFUS, *Moll. Mar. du Rouss.*, p. 370, t. 44, f. 12–16.—And of authors generally.—*Monodonta aegyptiaca* PAYR., *Moll. de Corse*, t. 6, f. 26, 27 (not of Lam.).—*T. tuberculatus* RISSO, *Hist. Nat. Eur. Mérid.*, iv, p. 128, t. 9, f. 133.

Easily recognized by the turritid, acuminate spire and the deep peripheral groove, which is narrower than in *G. declivis*, and lacks the central riblet. Several varieties (*lutea*, *nigra*, *rubra*, *albo-sordida* and *varia*, all of Scacchi) have been founded upon color mutations,—the shell being subject to the same variations in hue as *G. magus*.

The altitude is equal to, or greater or less than the diameter.

G. *GUTTADAURI* Philippi. Pl. 31, figs. 44–46.

Shell small, umbilicate, conical, whitish, irregularly maculated with reddish brown or purplish above, dotted beneath; whorls 6, turritid, very convex, the apex acute, encircled by three strong ribs, one on the periphery, the others above it, the interstices

lamellose-striate; plicate or lamellose-striate below the sutures; base with 6 or 7 concentric liræ; columella nearly straight, arcuate above, terminating in a tubercle below; umbilicus narrow.

Alt. 9, diam. 10; alt. 10, diam. 9 mill.

Sicilian and Dalmatian Coasts.

T. guttadauri PHILIPPI, *Enumer. Moll. Sicil.*, i, p. 177, t. 11, f. 1, and ii, p. 154.—PHIL., *Conchyl. Cab.*, p. 179, t. 28, f. 6.—FISCHER, *Coq. Viv.*, p. 147, t. 49, f. 2.

Smaller than the preceding, and tricingulate on the body-whorl.

G. FANULOIDES Fischer. Pl. 31, fig. 41–43.

Shell umbilicate, conoid, rather thick; whorls 5 to 6, convex, canaliculate, spirally granose-lirate, above nodose; cinereous maculated with red and vermilion; last whorl rounded, sulcate in the middle, finely granose-lirate in the sulcus; base convex, ornamented with 9 to 10 concentric liræ, the interstices narrow; aperture ovate; columella arcuate, base tuberculose; umbilicus smooth, profound.

Alt. 11, diam. 13 mill. (*Fischer.*)

Habitat unknown.

Trochus fanuloides FISCHER, *Journ. de Conch.*, 1874, p. 373.—*Coq. Viv.*, p. 333, t. 103, f. 3.

Combines the size of *G. fanulum* with the form of *G. declivis*.

G. PULCHERRIMA A. Adams. Pl. 61, figs. 26, 27.

Shell umbilicate, conoidal, solid, lusterless, white with a series of red spots below the sutures, another beneath the periphery, and more or less closely red-dotted over the whole shell. The spire is conical, acute, somewhat scalariform; the sutures very deeply impressed; whorls about 6, very convex, nodulose below the sutures, the entire surface covered with spiral liræ which are distinctly beaded on the base, less obviously so above, and which number about 12 on the penultimate, 20 on the last whorl. The aperture is subcircular, oblique; outer lip bevelled to an edge, the bevel iridescent, pearly; the interior is very regularly lirate, the folds numbering about 14; columella not thickened, arcuate, cut or excavated out, at its junction with the body produced forward in a white lobe, ending below in a denticle; umbilicus deep, with a slight spiral rib near its opening, ending in the columellar tooth. Alt. 14, diam. 16 mill.

China; Andaman Is.

G. pulcherrima A. AD. P. Z. S. 1854, p. 39.—*Forskälia pulcherrima* H. & A. AD., Genera, i, p. 432.—*Trochus* (*Forskählia*) *pulcherrimus* E. A. SMITH, P. Z. S. 1878, p. 818, t. 50, f. 22, 22a.

I am not at all sure that this beautiful shell is a *Forskälia*. It is quite variable in color. A specimen before me has no subsutural red blotches, but has a girdle of square spots below the periphery. Smith (*loc. cit.*) says: "The oblique arcuate pink or scarlet stripes on the upper part of the body-whorl, which in some specimens are black, generally terminate a little above the middle. At this part the whorl is encircled by two close-set granulous liræ, with a furrow on each side, whereof the lower is the most conspicuous. Immediately below this the color of the interrupted scarlet stripes changes to black and they assume the form of somewhat quadrate spots, but toward the aperture become more flame-like and merge into scarlet."

G. ALBIDUM Gmelin. Pl. 63, figs. 12, 13, 14.

Shell conical, umbilicate or imperforate, solid, whitish, painted with longitudinal stripes of red, brown or purple, the base striped, maculated or mottled; spire acute; whorls 7, tumid below the sutures and sometimes obsoletely plicate there, spirally lirate, the last tumid at the periphery, convex beneath; columella slightly sinuous and prominent in the middle; umbilicus white, funnel-shaped when open, frequently closed. Alt. 21, diam. 23 mill.

Sicily; Dalmatia; Italy; Greece.

Trochus cinerarius BORN, *Test. Mus. Cæs.*, p. 330, t. 11, f. 19, 20 (not *T. cinerarius* Linn.).—*T. albidus* GMEL., *Syst. Nat.*, xiii, p. 3576.—*T. biasoletti* PHILIPPI, *Enum. Moll. Sicil.*, i, p. 178, t. 10, f. 18.—*Conchyl. Cab.*, p. 187, t. 29, f. 1.—FISCHER, *Coq. Viv.*, p. 204, t. 68, f. 2.—*T. magulus* DESH., *Expéd. Morée.*, p. 144, t. 18, f. 26, 27.—*T. borni* CANTRAINE, *Mal. Médit.*, t. 6, f. 17.—? *T. sauleyi* D'ORBIGNY, *Hist. Nat. Canaries*, p. 83, t. 6, f. 24–26. (1844.)

This species is a miniature *G. magus*, without the subsutural tubercles of that species, and with narrower or closed umbilicus.

I quote with some hesitation the *T. sauleyi* of d'Orb., in the synonymy of this species, following Dr. Fischer. The figures of *T. sauleyi* cited above are copied on my plate 24, figs. 97–99. I am strongly inclined to consider *T. sauleyi* a form of *Monodonta sauciata* Koch. Born's figures, referred to by Gmelin, undoubtedly represent this species.

G. ARDENS Von Salis. Pl. 30, figs. 17-19.

Shell umbilicate, depressed conic, solid, usually reddish or olive-brown, with a subsutural series of short white flammules, a row of white spots on the periphery, the remainder of the surface sparsely punctate with white; spire acute, sutures markedly canaliculate; whorls about 7, convex, spirally lirate, the interstices obliquely regularly crispate-striate; liræ 5 or 6 on the penultimate whorl, frequently grooved, and usually with lirulæ between them; base with about 8 principal concentric liræ; aperture oblique, smooth within, but *apparently* sulcate; columella subdentate in the middle; umbilicus funnel-shaped, bordered by a white rib.

Alt. 12, diam. 15 mill.

Mediterranean and Adriatic Seas; Atlantic Coast of Portugal.

T. ardens VON SALIS MARSCHLINS, *Reise ins Koen. Neap.*, p. 376, t. 8, f. 9 (1793).—BUQUOY, DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 379, t. 45, f. 9-11.—*Gibbula ardens* MONTS., *Nom. Gen. e Spec.*, p. 40.—*T. fermonii* PAYRANDEAU, *Moll. de Corse*, p. 128, t. 6, f. 11, 12 (1826).—WEINKAUFF, *Conch. des Mittelmeeres*, ii, p. 377.—FISCHER, *Coq. Viv.*, p. 145, t. 48, f. 3.—*T. adansonii* BLAINVILLE, *Faune franc.*, t. 10a, f. 7.—*T. tessellatus* PHILIPPI, *Conchyl. Cab.*, p. 190, t. 29, f. 9-12.—*T. canaliculatus* DESHAYES, *Expéd. Morée*, iii, p. 137 (1832) (not of Lam., nor d'Orb.).—*Gibbula barbara* MONTEROSATO, *Nom. Gen. e Spec.*, p. 40 (1884).—*T. succinctus* MONTEROSATO, *Enum. e Synon.*, p. 20 (1878).

This species is allied to *G. albida* Gm. It is less elevated, has more deeply canaliculate sutures, is less carinate at the periphery, and is always umbilicate. The coloration is quite variable, as well as the sculpture.

Omitting the references given by some authors to Chemnitz and Gmelin, as entirely unidentifiable, the first description of this form is that of von Salis. The figure and description given by this author are perfectly applicable to the present form, although the figure (like all of von Salis's) is reversed! The next name in order is that proposed by Payrandeau.

Var. SUCCINCTA MONTS. Pl. 33, figs. 82, 83.

Liræ prominent, separated by profound narrow grooves.

Gulf of Gabes, Tunis.

Var. BARBARA Monts. Pl. 33, figs. 84.

Spire elevated, conical, acuminate; suture but feebly canaliculate; shell thinner and umbilicus narrower than in typical *G. ardens*.

Gulf of Gabes.

G. UMBILICARIS Linné. Pl. 32, figs. 63, 64, 65.

Shell umbilicate, conical, cinereous, reddish, or purplish-brown, obscurely clouded, dotted or flamed with white; spire conical, acuminate; whorls about 7, slightly convex, spirally striate or lirate, microscopically obliquely striate; the liræ generally subobsolete on the last whorl; periphery obtusely angulate; aperture rather small, oblique, rounded-quadrate, angled at the base, smooth within; columella arcuate above, straightened below.

Alt. 12–16, diam. 14–20 mill.

Mediterranean Sea.

T. umbilicaris LINN., *Syst. Nat.*, xii, p. 1229 (1766).—LAM., *An. s. Vert.*, vii, p. 28.—FISCHER, *Cog. Viv.*, p. 143, t. 45, f. 2.—BUQ., DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 376, t. 45, f. 1–8.—*T. fuscatus* GMEL., *Syst. Nat.*, xiii, p. 3576.—DESHAYES, *Expéd. Morée*, p. 142.—*Gibbula mediterranea* RISSO, *Hist. Nat. l'Eur. Mérid.*, iv, p. 136.—*G. desserea* RISSO, *loc. cit.*, p. 136.—*T. roissyi* BLAINVILLE, *Faune franc.*, p. 282, t. 10a, f. 9.—*T. zonatus* JEFFREYS, *Piedm. Coast*, p. 28.—*T. umbilicaris* var. *laticor et patula* (MONTEROSATO) BUG., DAUTZ. et Dollfus, *Moll. Mar. du Rouss.*, p. 378, t. 45, f. 6, 7, 8.

A species very closely related to *G. ardens* v. Salis. It differs in the smoother, more angulated body-whorl; the less canaliculate sutures; rounder mouth; deeper umbilicus, which, although as broad (or nearly so) as in *G. ardens*, is much less funnel-shaped, but nearly of the same width to a considerable depth; the whorl is also more angulated around the umbilicus than in the other species, and the columella is not dentate,

The coloration is extremely variable, as in nearly all the Mediterranean Trochids. In fact nearly every species of the smaller Trochidæ of this province exhibits the same patterns and modifications in coloration, commencing with (1) a series of white flames beneath the sutures, which (2) are continued as longitudinal, oblique, or undulating stripes to the base, or (3) are broken into maculations or articulations over the whole surface, or (4) the entire surface is either creamy white or uniform dark.

Var. LATIOR Monts. Pl. 33, fig. 89.

Large, thin, much depressed, the sutures profound; body-whorl depressed, carinated, finely lirate; aperture large, oblique, expanded; umbilicus broad, funnel-shaped. Alt. 9, diam. 15 mill.

Gulf of Gabes, Tunis.

I have also a conical form from Greece, nearly smooth.

Alt. 10, diam. 11 mill.

G. NEBULOSA Philippi. Pl. 63, figs. 15, 16.

Shell conoidal, umbilicate, solid, reddish, spotted with white; whorls slightly convex, grooved by 6 superficial sulci, the last rounded-angular; base grooved with 4 striæ; umbilicus patulous, smooth, white; aperture suborbicular. (*Phil.*)

This species approaches near to *T. umbilicaris* L. in the structure of the umbilicus and the sculpture, but it differs in the smaller size, much more elevated whorls, the last less angular. The sculpture of the upper surface consists of 6 to 7 *impressed* spiral lines (not of elevated liræ), which become evanescent below the periphery, the base showing about 4. The color is reddish, with white spots, especially above and beneath the suture; the conic apex is blackish.

Alt. 10, diam. $10\frac{2}{3}$ mill.

Mediterranean at Alexandria; Red Sea.

T. nebulosus PHIL. Zeitschr. f. Mal. 1848, p. 109; Conchyl. Cab. p. 232, t. 35, f. 5.

Probably a synonym of *G. umbilicaris*.

* * *

(*Phorcus.*)

G. VARIA Linné. Pl. 33, figs. 77, 80, 81.

Shell umbilicate, conical, solid, dull, lusterless yellowish white or pinkish, with flexuous radiating cinereous or violaceous stripes below the suture, the entire surface finely mottled and dotted with yellowish or violaceous and white; spire conical, short, not acuminate as in *G. ardens* and *umbilicaris*; whorls about 6, flattened, separated by slightly impressed sutures, encircled by numerous fine striæ; body-whorl obtusely angular at the periphery; aperture large, very oblique, smooth within; columella oblique, straightened; umbilicus funnel-shaped, whitish within.

Alt. 12, diam. 15 mill.

Mediterranean Sea.

T. varius LINN., Syst. Nat. xii, p. 3568.—FISCHER, *Coq. Viv.*, p. 259, t. 87, f. 2.—PHILIPPI, *Conchyl. Cab.*, p. 191, t. 29, f. 8, 13.—HANLEY, *Ipsa Linn. Conch.*, p. 318.—BUQ., DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 385, t. 46, f. 6-14.—*T. roissy*, PAYR., *Moll. de Corse*, t. 6, f. 13, 14.—*T. pallidus* FORBES, *Rep. Æg. Inv.*, p. 138.—*T. elata* BRUSINA, *Conch. Dalm. Ined.*, p. 26.—*T. gibbosula* BRUS. *Contr. Fauna Dalmatia*, p. 80.

This form connects the preceding with the following group of species. It is less acuminate in the spire than *G. umbilicaris*, more finely spirally striate, and with much more oblique aperture and expanded umbilicus; from *G. richardi* the flatter whorls and spiral striae separate it. The periphery is sometimes rounded.

G. PHILBERTI Récluz. Pl. 31, figs. 25, 26, 27.

Shell small, umbilicate, conical, thin; coloration very variable, sometimes uniform dark brown or red, sometimes cinereous, longitudinally clouded with brown, or with spiral series of blackish dots; spire low-conic, gradate; sutures impressed; whorls 6, a little gibbous just below the sutures, causing the spire to be somewhat turritid; whorls encircled by numerous fine *unequal* lirulæ or striae; periphery obtusely angular; base convex, generally a little more coarsely lirate than the upper surface; aperture subquadrangular, oblique, not angled at the junction of basal lip and columella; columella perceptibly arcuate; umbilicus large, funnel-shaped, white, margined by one or several spiral riblets.

Alt. 6-11, diam. 8-12, mill.

Mediterranean Sea.

T. philberti RECLUZ, *Rev. Zoologique*, 1343, p. 11.—MONTEROSATO, *Conch. litt. Médit.*, p. 8.—BUQ., DAUTZ. ET DOLLFUS, *Moll. Mar. du Rouss.*, p. 383, t. 46, f. 1-5.—*T. villicus* PHILIPPI, *Enum. Moll. Sicil.*, ii, p. 152, t. 25, f. 14 and *Conchyl. Cab.*, p. 194, t. 29, f. 17.—FISCHER, *Coq. Viv.*, p. 258, t. 87, f. 1.

A smaller species than the preceding, quite stable as to form, but exhibiting great variation in the development of the spiral riblets. Sometimes all are small, nearly equal, and sometimes several larger ones are developed upon the upper surface.

G. LEUCOPHÆA Philippi. Pl. 31, figs. 29, 30.

Shell elevated-conical, slightly obtuse, umbilicata, spirally striate, ashen, spotted and marbled with white, brown and black dots; whorls contiguous, flat, smooth, the last angulated; aperture sub-

quadrangular; columella oblique, straight, scarcely nodulose; umbilicus narrow, funnel-shaped. (*Phil.*)

The shell consists of $6\frac{1}{2}$ whorls, which are flat, scarcely separated from each other; they form an elevated cone with blunt apex, and the last passes into the base in a sharp angle. The sculpture consists of 6 to 9 uneven, elevated, smooth spiral lines on the upper surface, and about 8 similar concentric liræ on the base. The umbilicus is pretty narrow, widening and funnel-shaped at the opening. The color is just as in *T. villicus*. From this, its nearest ally, *leucophæus* is separated by (1) its size; (2) its completely flat whorls; (3) the numerous spiral lines; (4) the narrower umbilicus.

Alt. 8, diam. $4\frac{1}{2}$ mill. (*Philippi*.)

Sicily.

T. leucophæus PHIL. Moll. Sicil., i, p. 182, t. 10, f. 17; ii, p. 153.—Conchyl. Cab., p. 195, t. 29, f. 19.—FISCHER, Coq. Viv., p. 340, t. 106, f. 1.—WEINKAUFF, Die Conchyl. des Mittelmeeres, ii, p. 370.—*T. cinerascens* ANTON, Verzeich., p. 57.

This is a small species, often not attaining the dimensions given above.

G. SPRATTI Forbes. Pl. 32, figs. 70, 71.

Shell narrowly perforate, conoid, somewhat thick, whitish, radiately flammulate with deep brown subquadrate maculations, very finely obliquely striate, concentrically liræ, each whorl encircled by two more prominent, remote sulci; whorls 6, convex, separated by deep sutures, inflated above; last whorl subangulate, convex beneath, with numerous unequal concentric liræ; aperture rhomboidal; columella sinuous in the middle, slightly convex.

Alt. 8, diam. 6 mill. (*Fischer*.)

Ægean Sea.

T. spratti FORBES, Rep. Brit. Asso. Adv. Sci., 1843, p. 190 (1844).—MONTEROSATO Nuova rivista della Conch. Medit., p. 23.—WEINKAUFF, Conch. des Mittelmeeres, ii, p. 384.—FISCHER, Coq. Viv., p. 148, t. 49, f. 3.—*T. alveolatus* PHIL. Conchyl. Cab., p. 207, t. 30, f. 14.—? *T. pictus* PHIL., Zeitschr. f. Mal., 1846, p. 104.

Philippi's *T. alveolatus* is figured on pl. 33, fig. 93.

G. CANDEI d'Orbigny. Pl. 48, figs. 21, 22.

Shell conoidal, elevated, longitudinally, gracefully, unequally striate, olive-yellowish, ornamented above with purplish spots; spire

gradate; whorls subbicarinate, smooth above and flat; aperture subquadrangular; umbilicus open, smooth.

Alt. 12, diam. 15 mill. (*Orb.*)

Canary Is.

T. candei D'ORB., Hist. Nat. Iles Canaries, Mollusques, p. 82, t. 6, f. 21-23.—PHILIPPI, Conchyl. Cab., t. 34, f. 15.

Known to me only by the description and figures of Orbigny.

G. RICHARDI Payraudeau. Pl. 32, figs. 54-56.

Shell umbilicate, conoidal, olivaceous or yellowish, ornamented with obliquely longitudinal tawny stripes; entire surface smooth; spire short, conical; sutures deeply impressed; whorls 5, quite convex, the last flattened and sloping around the upper part, very obtusely subangular around the periphery; aperture large, very oblique; outer lip thin, acute, very narrowly margined with yellow, succeeded by a line of black, within which lies a band (about 2 mill. wide) of opaque white; columella arcuate above, partly surrounding the umbilicus with a white callus, straightened in the middle; umbilical tract large, white, funnel-shaped, bounded by a carina. Alt. 15, diam. 17 mill.

Mediterranean and Adriatic Seas.

Monodonta richardi PAYR., *Moll. de Corse*, p. 138, t. 7, f. 1, 2.—*Trochus Richardi* PHILIPPI, *Conchyl. Cab.*, p. 189, t. 29, f. 4, 5, 7.—FISCHER, *Coq. Viv.*, p. 142, t. 48, f. 1.—B., D. ET D., *Moll. du Rouss.*, p. 399, t. 47, f. 6-13.—*Phorcus margaritaceus* RISSO, *Hist. Nat. Eur. Mérid.* iv, p. 133, t. 4, f. 47.—*T. radiatus* ANTON, *Verzeich.*, p. 57 (*Teste Philippi*).

Type of Risso's genus *Phorcus*. A species peculiarly attractive in appearance; it is smoother than its allies, and striped upon an olive-yellowish ground with a very pleasing and unusual tawny or cadmium orange hue. Rarely unicolored olivaceous specimens occur, or shells with a ground color of crimson.

G. DIVARICATA Linné. Pl. 33, figs. 74, 75, 76, 78, 79.

Shell imperforate or narrowly perforate, conoidal, very thick and solid, cinereous, yellowish or green, longitudinally marked with rose-red lines, often oblique or broken into square dots; spire more or less elevated, its outlines rather convex; whorls about 6, encircled by numerous lirule, the upper ones flattened, sutures slightly impressed, but scalariform specimens with deep sutures are frequent; last whorl rounded at the periphery and on the base; aperture

rounded-quadrate; outer lip bevelled to an edge, very thick and smooth within; columella straightened in the middle, pearly; umbilicus narrow or concealed. Alt. 15–23, diam. 16–19. mill.

Mediterranean and Adriatic Seas.

Trochus divaricatus LINN., *Syst. Nat.*, xii, p. 1229.—HANLEY, *Ipsa Linn. Conch.*, p. 319.—HIDALGO, *Mol. Mar. Esp.*, t. 61, f. 4–8.—DESHAYES, *Ann. de Malac.* i, t. 2, f. 4 (animal).—FISCHER, *Coq. Viv.*, p. 139, t. 47, f. 1, 2.—PHILIPPI, *Conchyl. Cab.*, p. 193, t. 29, f. 16, 21.—BUQ. DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 391, t. 46, f. 15–22.—*Mondonta Lessoni* PAYR., *Moll. de Corse*, p. 139, t. 7, f. 3, 4.—*T. rarilineatus* MICHAUD, *Actes Soc. Linn. Bord.*, iii, p. 266, f. 12 (1829).—BUQ. DAUTZ. ET DOLLF., *Moll. Rouss.*, p. 393, t. 46, f. 23–27.—*Gibbula purpurata* BRUSINA, *Conch. Dalm. ined.*, p. 26.

May be known by the very thick, heavy shell and peculiar painting.

Var. *RARILINEATA* Michaud. Pl. 33, figs. 90, 91.

Smaller, more conical, with angulate periphery and flattened base. Alt. 12, diam. 13 mill.

G. *CINERARIA* Linné. Pl. 30, figs. 23, 24. Pl. 33, figs. 86, 87, 88.

Shell narrowly umbilicate, rarely imperforate, conical, thick, cinereous, densely marked with numerous narrow longitudinal brown or reddish lines, or broader stripes; whorls 6, flattened, with 7 or 8 thread-like spiral ridges on the upper surface of the body-whorl, with often one or two finer striæ between each ridge, and about a dozen fine ridge-like striæ on the under side; the last whorl angulate at the periphery, somewhat convex beneath; aperture sub-rhomboidal, smooth within; columella straightened in the middle; umbilicus narrow. Alt. 13–16, diam. 14–16 mill.

European Seas, from Scandinavia to Gibraltar; Black Sea?

T. cinerarius LINN., *Syst. Nat.*, xii, p. 1229.—FORBES AND HANLEY, *Hist. Brit. Moll.*, t. 65, f. 1–3.—JEFFREYS, *Brit. Conch.*, t. 62, f. 3.—PHILIPPI, *Conchyl. Cab.*, p. 222, t. 34, f. 2–4.—FISCHER, *Coq. Viv.*, p. 192, t. 62, f. 4.—*T. lineolatus* MICHAUD, *Galerie*, i, p. 334, t. 30, f. 8–9.—*T. cinerarius* var. *electissimus* (BEAN) THORPE, *Brit. Mar. Conch.*, p. 264.—*T. fumosus* PHILIPPI, *Zeitschr. f. Mal.* 1849, p. 156; *Conchyl. Cab.*, p. 304, t. 44, f. 5.

Var. *ELECTISSIMA* (Bean) Thorpe.

Smaller and more regularly conical.

Var. FUMOSA Philippi.

Yellowish, marked above with large reddish maculations, the base radiately striped with brownish-gray; form more elevated and slenderer than in *T. cinerarius*. Alt. 10, diam. 10 mill.

Habitat unknown.

G. OBLIQUATA, Gmelin. Pl. 30, figs. 11-16.

Shell *more depressed* than *G. cineraria*, and (although the base is *flatter*) never inclined to a pyramidal form; the spiral ridges are sharper and fewer, especially in the young; the coloring is different; both have a similar kind of marking, but in the present species the longitudinal rays or streaks are red, besides being broader and not half so many as in the other species; and they are sometimes zig-zag, instead of being broken into spots or interrupted by the sculpture; this species is *striped*, the other *lineated*; just within the outer lip are two borders, one of yellow, the other of green variegated by red spots, this edging is minutely tubercled like shagreen.

Alt. 17, diam. 20 mill. (*Jeffreys.*)

T. obliquatus GMEL., *Syst. Nat.*, xiii, p. 3575.—PHILIPPI, *Conchyl. Cab.*, p. 223, t. 34, f. 5-9.—FISCHER, *Coq. Viv.*, p. 191, t. 62, f. 2, 3.—*T. umbilicatus* MONTAGU, *Test. Brit.*, p. 286.—JEFFREYS, *Brit. Conch.*, iii, p. 312 (and of other English authors).—*T. umbilicalis* FORBES AND HANLEY, *Hist. Brit. Moll.*, ii, p. 519, t. 66, f. 1-4.—*T. pennanti* PHILIPPI, *Conchyl. Cab.*, p. 224, t. 34, f. 10.—*T. agathensis* RECLUZ, *Rev. Zool.*, 1843, p. 11.

The present species is usually more widely umbilicate and broader than *G. cineraria*.

Var. AGATHENSIS Récluz.

Smaller, with the spire more raised; less angular at periphery, and somewhat glossy beneath; stripes purplish; umbilicus closed or nearly so.

G. TURDUS Philippi. Pl. 33, figs. 98, 99.

Shell solid, globose-conical, white, ornamented at the suture with pale brown spots, the rest of the shell painted with articulated lines of reddish-brown; whorls nearly plane, a trifle tumid at the suture above, quadrisulcate, the last whorl angular at the circumference, margined, the base grooved by 4 to 6 sulci; umbilicus moderate, cylindrical; aperture squarish-rounded. (*Phil.*)

The solid shell is rather conical, for the whorls are quite level, only projecting a little below the suture. They are grooved by 4 narrow slightly impressed furrows, besides which the last whorl has a few inconspicuous furrows. The last whorl is angular at the periphery and the ridge between this angle and the lower of these furrows is somewhat more elevated than the rest of the upper surface. The base is rather elevated, with 4 to 6 slight narrow concentric furrows. The umbilicus is moderate, round, white, with a sharp angle inside the outer edge. The aperture is quadrangular, with well-rounded angles. The columella is rather arcuate. The color is pale brown, at the suture white with large brown spots, sometimes with reddish-brown oblique strokes between every two furrows; the base is checkered with white.

Alt. 8, diam. 8 mill. (*Philippi*.)

Habitat unknown.

T. turdus PHIL. *Conchyl. Cab.*, p. 308, t. 44, f. 11.

G. ADANSONI Payraudeau. Pl. 30, figs. 1-4.

Shell narrowly umbilicate, conical; color maroon or deep brown, with longitudinal undulating flames of white, continuous or interrupted into spots on the base; spire conoidal, elevated; whorls 6 to 7, convex, traversed by numerous spiral striæ; last whorl large, dilated, subangulate at the periphery, the base convex, concentrically finely lirate, each ridge divided by a central impressed line; sutures deeply impressed; aperture subquadrangular, columella straight or a little projecting in the middle; umbilicus deep, very narrow, bounded by a carina. Alt. 12, diam. 10½ mill.

Mediterranean, Adriatic and Black Seas.

T. adansonii PAYR., *Moll. de Corse*, p. 127, t. 6, f. 7, 8 (1826).—PHILIPPI, *Conchyl. Cab.*, p. 192, t. 29, f. 14, 15.—FISCHER, *Coq. Viv.*, p. 343, t. 107, f. 1-4.—BUQ, DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 394, t. 47, f. 1-5.—*T. varians* DESH., *Expéd. Morée*, p. 142, t. 18, f. 31-33.—*T. adriaticus* PHIL., *Enum. Moll. Sicil.*, ii, p. 153, t. 25, f. 10.—*T. turbinoides* DESH., *Expéd. Morée*, p. 143, t. 18, f. 28-30.—BUQ, DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 396, t. 47, f. 26-30.—*T. helicoides* PHILIPPI, *Conchyl. Cab.*, p. 197, t. 29, f. 23.—*Gibbula ivanicsi* BRUSINA, *Conch. Dalm. ined.*, p. 27.—*T. ivanicsiana* BRUS., *Contr. pella Fauna Dalm.*, p. 80.—*T. olivaceus* ANTON, *Verzeich.*, p. 57.—*T. angulatus* (EICHWALD) BRUS. (*teste* Monterosato, *Il Nat. Sicil.*, iii, p. 105).—*T. euxinicus* ANDR., KRYN.

Bull. Sci. Nat. Moscou, 1837, p. 60.—*T. variegatus* RISSO, *teste* Monterosato.—*T. olivaceus* ANTON, Verzeich., p. 57.—*T. pumilio* PHIL. Enum. Moll. Sicil., ii, p. 226, t. 28, f. 7; Conchyl. Cab., p. 94, t. 15, f. 19.

A variable species, distinguished from the preceding by its more elevated form and thinner shell. From *G. tumida* Montagu the more acute spire will separate the present species; and also the shape of the whorls, which are less tumid and angulated below the sutures. The form and coloration are very mutable and also the sculpture varies, sometimes being quite coarse. *T. pumilio* Phil. may belong in *Calliostoma*. It is figured on pl. 40, fig. 35.

Var. ADRIATICA Philippi. Pl. 30, fig. 1.

Shell more solid, generally paler, the base whitish; spiral sculpture stronger, the penultimate whorl with about 5 well-marked, separated spiral liræ; body-whorl angulate at the periphery.

Var. TURBINOIDES Deshayes. Pl. 33, figs. 94, 95.

Shell smaller than *G. adansoni*, globose, rose-red, yellowish, or brown, with short white flammules below the sutures, the remainder of the shell minutely punctate with white. Alt. 8, diam. 8 mill.

G. DREPANENSIS Brugnone. Pl. 33, figs. 100, 101.

Shell small, narrowly umbilicate, depressed, *stomatella*-shaped, whitish, zigzagly striped with red, the stripes often broken into spots, white around the umbilicus; spire very short; sutures impressed; whorls $3\frac{1}{2}$ to 4, convex, rapidly widening, encircled by spiral striae which are nearly obliterated on the last whorl; body-whorl very large, depressed; aperture large, oblique, subcircular; columella arcuate. Alt. 3–4, diam. 4–5 mill.

Provence; Sicily; Sardinia; Algiers.

Trochus drepanensis BRUGNONE, *Miscellanea malacologica*, pt. 1, p. 13 (1873).—MONTEROSATO, *Journ. de Conch.*, xxv, p. 31, t. 2, f. 6 (1877).—BUQ. DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 398, t. 50, f. 25, 26.

This smallest of the Mediterranean species of *Gibbula*, is very distinct in its minute size, obsoletely striate whorls and *stomatella*-like form.

Monterosato has described a *G. vimontile* (Il Nat. Sicil., iii, p. 106) which I take to be a form of *drepanensis*. His description

(translated) is as follows: More depressed; whorls subangulate; smooth instead of striate; of a greenish color, with metallic reflections.

Provence; Algiers; Italy.

G. TUMIDA Montagu. Pl. 32, figs. 49-52.

Shell small, narrowly umbilicate, conical, elevated; color whitish, variously strigate or maculated with brown, beneath white, unicolorous or punctate with brown; spire elevated, somewhat turritid, apex acute; sutures impressed; whorls 6, convex, encircled by numerous, close fine striae; periphery obtusely angular; base slightly convex, concentrically finely lirate, the sculpture coarser than upon the upper surface; aperture large, rounded-quadrate; columella oblique, straightened and a little convex in the middle; umbilicus deep, narrow, expanding and funnel-shaped at its opening.

Alt. 8-12, diam. 7-12 mill.

English and Northern European Coasts; rare in the Mediterranean.

T. tumidus MONT., *Test. Brit.*, p. 280, t. 10, f. 4. (1803).—PHILIPPI, *Conchyl. Cub.*, p. 195, t. 29, f. 20-25.—FORBES AND HANLEY, *Hist. Brit. Moll.*, ii, p. 153, t. 65, f. 8, 9.—JEFFREYS, *Brit. Conch.*, iii, p. 307, t. 62, f. 2.—FISCHER, *Cog. Viv.*, p. 345, t. 108, f. 1, 2, 3.—BUQ., DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 387, t. 47, f. 14-18.—*T. Racketti* PAYR., *Moll. de Corse*, p. 128, t. 6, f. 9, 10.—BUQ., DAUTZ. ET DOLLFUS, *Moll. du Rouss.*, p. 388, t. 47, f. 19-25.—*T. tumidus* var., FISCHER, *Cog. Viv.*, p. 315.—? *Gibbula pygmaea* RISSO, *Eur. mérid.*, iv, p. 137.—MONTEROSATO, *Conch. litt. med.*, p. 9, *Gibbula gibbosula* (DAN. ET SANDRI) BRUSINA, *Conch. Dalm. ined.*, p. 27.—*T. petholatus* DILLWYN, *Catal.*, p. 776 (*Teste Philippi*).

This turbinate little species is readily recognized by the form, the whorls being a little tumid just below the sutures, and the base of the aperture is usually a little emarginate.

VAR. RACKETTI Payrandeau. Pl. 33, figs. 96, 97.

This form differs from typical *G. tumida* in the constant smaller size, fewer whorls (4 to 5), and generally more solid and deeply colored shell. Alt. 6½, diam. 6 mill.

Mediterranean and Adriatic Seas.

This little Mediterranean variety is variable in proportions, frequently as broad or broader than long.

G. HEMPRICHII Issel. Pl. 47, fig. 100.

Shell minute, orbiculate-conoid, umbilicate, under a lens longitudinally striate, shining, whitish, painted with oblique chestnut streaks, spotted with brown; apex rather obtuse; whorls 5, regularly increasing, rather convex, flattened at the distinctly impressed sutures, the last whorl scarcely equalling half the total altitude; base rounded or obscurely subangular; aperture quadrate-rounded; peristome simple, acute; columella subtruncate at base; umbilicus rather narrow, funnel-shaped. Alt. $2\frac{1}{2}$, diam. $2\frac{1}{2}$ mill. (*Issel.*)

Gulf of Suez.

T. hemprichii ISSEL, Malac. del Mar Rosso (1869).—SAVIGNY Descript del'Egypte, Coq., t. 3, f. 6.

G. SISMONDÆ Issel. Pl. 47, figs. 94, 95.

Shell small, conoidal, imperforate, minutely transversely striate, greenish, obtuse at apex; whorls $4\frac{1}{2}$, slowly increasing, slightly convex, separated by impressed sutures; last whorl more than half the total length, angular at base; base flattened, ornamented with 4 concentric costulae; aperture very oblique, subcircular.

Alt. 4, diam. 4 mill. (*Issel.*)

Suez.

T. sisimondæ ISSEL, Malac. Mar Rosso, p. 225, t. ii, f. 13.

In general form this species approaches *T. tumidus* Mont., but it is distinguished by having no umbilicus, and by its greenish color. (*Issel.*)

G. SPURCA Gould. Pl. 51, figs. 22, 23.

Shell small, solid, globose-conic, everywhere sculptured with fine, shallow, revolving alternate grooves and elevations; shining, of a dingy yellowish color, delicately variegated with oblique zigzag dusky lines, the two colors in about equal proportions, a series of somewhat conspicuous quadrate dusky and yellow spots just below the suture; whorls 4 or 5, ventricose; suture deeply impressed; the last subangular at periphery; base moderately conical, imperforate or minutely umbilicated; aperture very oblique, circular; columella rounded, arcuate; lip sharp, smooth within and subnacreous.

Alt. 3-10ths, diam. 3-8ths inch. (*Gould.*)

Madeira Is.

Has most of the characters of *T. ferroui* but is much smaller, wants the peculiar channelled shoulder of the whorls, and the widely open umbilicus. (*Gould.*)

T. spurcus GLD., Proc. Bost. Soc. N. H, iii, p. 106 (1849); U. S. Expl. Exped. Shells, p. 188, f. 219; Otia, p. 58.

G. GORGONARUM Fischer.

Shell imperforate, conical, slightly elevated, rather thick, pale buff or ashen above, ornamented with subflexuous, irregular radiating brown lines, white beneath; whorls 7 to 8, flattened, separated by canaliculate sutures, ornamented with a few narrow liræ, evanescent in the middle of the whorl; infra-sutural liration larger, crenulated; last whorl acutely carinated; base densely, concentrically lirate; aperture rhomboidal, lip acute; basal callous wide, subcircular, covering the umbilicus.

Alt. 10, diam. maj. 14, diam. min. 12 mill. (*Fischer.*)

Cape Verde Is., in 410–596 meters.

G. gorgonarum FISCHER, Journ. de Conchyl. 1883, p. 393.

G. GLYPTUS Watson. Pl. 36, f. 19, 20.

Shell like *T. magus* L., but carinated, higher, less scalar, and much more delicately and richly sculptured. Sculpture, spirals—a flat shoulder below the suture is followed by an angulation, on and below which is a double row of smallish, round but pointed tubercles, which are remote from one another but run in pairs on the two rows; the tubercles in each row are connected by a slight rounded thread; on the second, third and fourth whorls these rows coalesce into one; on the last whorl they are about 5–100 inch apart. At the periphery is a strong angulation bearing a sharp carina. About 5–100 inch above this is a spiral thread, which, as well as the carina, is ornamented with delicate, sharp, laterally-compressed beads separated from one another by about twice their own size. Those on the upper spiral are rather the larger; the middle of the whorl for about 0.1 inch is bare. On the base there are five closely-beaded threads, of which the inmost and strongest defines the umbilicus. Between the outermost and the carina is a broad slightly sunken furrow. The carina meets the outer lip and appears above the suture. Longitudinals—the upper whorls are ribbed, but the ribbing gradually breaks into the double row of paired tubercles, and the link uniting the pairs in the two rows becomes very feeble. There are besides many distant, irregular, loose, skin-like puckerings which follow the lines of growth; they disappear on the spiral threads. The whole surface is further roughened by microscopic flexuous wrinklins. Color yellowish white on the

thin calcareous layer overlying the naere. Spire high, a little scalar. Apex small and sharp. Whorls 8, of regular increase, a little rounded, angulated at the carina, rather tumid on the base, with a wide umbilicus. Suture angulated and well defined, but a little filled up by the carina of the overlying whorl. Mouth (apparently) perpendicular, semioval. Outer lip well rounded. Pillar-lip a little bent over on the umbilicus, and then advancing rather straight toward the left, angulated and slightly toothed at the point of the base when the umbilical beaded thread joins it. Umbilicus a wide deep funnel, with a deep spiral staircase at the junction of the whorls. Alt. 0.68 inch; diam. 0.72, least 0.61 inch.

This beautiful species is unfortunately present in only one dead and chipped specimen. The name given to it is expressive of the singular beauty of its sculpture. It is more like *Trochus magus*, L., than any other species I know, but is obviously very different in all details of form and sculpture. It has some resemblance to *Trochus otto* Phil., but is higher and narrower; that species has a broadly open but immediately contracted umbilicus, which rather resembles a scoop than a funnel; its whorls are much less tumid above, and are less sculptured; they slope downwards conically, from the suture with only one feeble and feebly tubercled thread between the suture, to which it lies near, and the peripheral thread. (*Watson*.)

Off Sydney, 410 fms.

T. glyptus WATSON, Journ. Linn. Soc. London, xiv, p. 694; Challenger Gasterop., p. 75, t. 6, f. 6.

B. Species of Indo-Pacific and Australasian Seas.

G. PICTURATA Adams et Angas. Pl. 37, figs. 28-30; pl. 30, fig. 7.

Shell small, narrowly umbilicate, conical, excessively variable in coloration, the following patterns most usual; (1) whitish with longitudinal broad or narrow red or crimson flames reaching to the periphery, the ground-color and base dotted with red; the flames are frequently interrupted in the middle by a dotted zone; (2) ground-color clear yellowish or whitish, the liræ dotted with red; this pattern frequently shows short flames of red under the sutures; (3) entire surface purplish black, the umbilicus green-tinged. Except the last variety, all are whitish around the umbilicus; in all, the inside of the umbilicus and the columella are tinged with green. Spire elevated, conical, rather obtuse; sutures impressed; whorls 5 to 6, convex, encircled by liræ, usually 5 or 6 in number on the

penultimate whorl, but very variable; body-whorl with a prominent rib at the periphery, convex beneath; aperture quadrangular, delicately ribbed within and iridescent, green predominating; columella arcuate above, then straight and oblique, terminating near the base in a slight denticle. Alt. 6-7, diam. 6-7 mill.

Codgee Bay, N. S. Wales.

G. picturata AD. ET ANG., *P. Z. S.*, 1864, p. 36.—*T. picturatus* FISCHER, *Coq. Viv.*, p. 272, t. 90, f. 2.

A beautiful little species, usually either flamed with dark red or dotted all over with pink. The ground-color sometimes has a green cast, or is pink.

G. FULMINATA Hutton. Pl. 43, figs. 14-16.

Shell small, narrowly perforate, globose-conoidal, shining, solid, smooth, except for a few striae around the umbilicus; color pink, orange, purplish or olive-brown, generally with a series of white blotches alternating with self-colored darker ones below the sutures, a girdle of white blotches around the periphery and often around the umbilicus; the intervening spaces irregularly strigate with darker zigzag streaks or unicolorous. Spire short, apex rosy; whorls about 5, convex; aperture rounded-quadrangle, iridescent within, the lip white-margined; columella arcuate, a trifle straightened in the middle; umbilicus white. Alt. $7\frac{1}{2}$, diam. $7\frac{1}{2}$ -8 mill.

Auckland to Wellington, N. Z.; Chatham Is.

Chrysostoma fulminata HUTTON, *Cat. Mar. Moll. N. Z.*, p. 36 (1873).—*Margarita fulminata* HUTTON, *Proc. Linn. Soc. N. S. Wales*, ix, 1884, p. 364.

Differs from *G. nitida* in the white umbilicus, more globose form and different color-pattern; from *G. picturata* in the heavier texture and lack of spiral liræ.

G. ROSEA Hutton.

Whorls faintly spirally striated; very narrowly umbilicated; pinkish white, with three or four narrow pink spiral bands and some purplish spots on the body-whorl near the suture.

Alt. .15, diam. .23 inch. (*Hutton.*)

Stewarts Id.; Campbell Id.

Chrysostoma rosea HUTTON, *Cat. Mar. Moll. N. Z.*, p. 36 (1873).—*Margarita rosea* HUTTON, *Proc. Linn. Soc. N. S. Wales*, ix, 1884, p. 364.

G. ANTIPODA Hombron et Jacquinot. Pl. 33, figs. 102–104.

Shell small, composed of three whorls, the two first very small, the third very large; color iridescent above and below, with green transverse bands on the superior portion; aperture large, round, acute on the left, and with a flat border on the right margin; umbilicus only indicated and nearly covered by the right lip.

Alt. 8, diam. 8 mill. (*Hombr. et Jacq.*)

Auckland Is.

Margarita antipoda HOMB. ET. JACQ., *Voy. au Pole Sud*, Zool., v, p. 58, t. 14, f. 26–28 (1854).—HUTTON, *Proc. Linn. Soc. N. S. Wales*, ix, 1884, p. 363.

Nothing is known of this species except the original description translated above, and the original figures.

G. NITIDA Adams et Angas. Pl. 37, figs. 25, 26, 27.

Shell narrowly umbilicate, conical, rather thin, shining, olive-yellow, marked with *numerous continuous capillary white spiral lines*, and longitudinal olive-colored flames, generally broken into oblong quadrangular tessellations on the spaces between the white lines, frequently red instead of olive below the sutures and on the base; spire elevated, with convex outlines; apex acute; last whorl obtusely angular around the periphery; base lighter than upper surface, with 7 or 8 delicate concentric liræ; aperture rounded-quadrate, outer lip very finely crenulated, within brilliantly iridescent; columella arcuate; umbilicus funnel-shaped, yellowish or olive-tinted within.

Alt. $6\frac{1}{2}$, diam. $5\frac{1}{2}$ mill.

Hokianga, Auckland to Wellington, N. Zealand.

Gibbula nitida AD. ET ANG., *P. Z. S.* 1864, p. 36.—HUTTON, *Proc. Linn. Soc. N. S. Wales*, 1884, p. 364.—*Chrysostoma inconspicua* HUTTON, *Cat. Mar. Moll. N. Z.*, 1873, p. 36.

Coloration peculiar in the white spiral striæ of the upper surface, combined with longitudinal flames. The base has delicate separated concentric striæ; the interior is brilliantly iridescent, like an *Elenchus*.

G. STOLICZKANA G. et H. Nevill. Pl. 62, figs. 76, 77.

Shell small, umbilicate, conical, elevated, rather solid, reddish-brown or olive-brown, flammulate above with white, the base tessellated brown and white; spire elevated; whorls about 5, slightly convex, lusterless, spirally lirate, the liræ about 9 on the penultimate

whorl; last whorl high, the lip a little deflected toward the aperture, periphery angular, base angular around the umbilical region, with about 8 concentric liræ, the outer ones often obsolete; aperture oblique, about half the length of the shell, somewhat triangular, brilliantly iridescent within; columella white, arcuate, *truncate at the base*; umbilicus narrow, white. Alt. $5\frac{1}{2}$ –6, diam. 4–5 mill.

Ceylon.

G. stoliczkana G. & H. NEVILL, *Journ. Asiatic Soc. Bengal*, xxxviii, 1869, p. 158, t. 17, f. 2, 3.—*Trochus stoliczkanus* FISCHER, *Cog. Viv.*, p. 341, t. 106, f. 2.

This form, whilst it groups with the preceding and following species, is quite distinct. The surface is lusterless, the liræ are rather coarse, broad and flat; the lower right hand margin of the aperture decidedly produced, and the base usually somewhat notched or emarginate as in the European *G. tumida* Mont. The white flames are occasionally absent.

G. DUPONTIANA G. et H. Nevill. Pl. 30, fig. 5.

Shell perforate, conical, elevated, solid, lusterless white, painted with radiating brown stripes extending from suture to periphery, where an equal number of spots is intercalated; base dotted; spire conic, with nearly straight outlines; whorls 6, planulate, encircled by coarse liræ, which number 6 or 7 on the penultimate whorl, the same number on the base; body-whorl carinated; base slightly convex, not angulated around the umbilicus, but impressed; aperture very oblique; columella somewhat arcuate, nearly straight in immature specimens. Alt. $6\frac{1}{2}$ –7, diam. 5–6 mill.

Ceylon.

G. dupontiana NEVILL, *Journ. Asiatic Soc. Bengal*, xxxviii, p. 158, t. 17, f. 8, 1869.—*T. dupontianus* FISCHER, *Cog. Viv.*, p. 342, t. 107, f. 3.

Coarsely lirate like the preceding form, but more conical, more carinate, with flatter base, and columella not truncate below. The color too is much lighter.

G. BLANFORDIANA G. et H. Nevill. Pl. 37, fig. 32; Pl. 62, fig. 65.

Shell small, narrowly, deeply umbilicate, thick, conoid; whorls 5, the first whitish, the following painted with brown undulating, radiating maculations, spirally strongly lirate, the liræ 5–6 on the penultimate whorl, smaller above, the interstices deep last whorl,

angulate in the middle, a little convex beneath, provided with about 8 flat concentric liræ; aperture subrhomboidal, lip plicate within, basal margin crenate; columella oblique, sub-truncate below.

Alt. 5, diam. 6 mill. (*Fischer.*)

Ceylon.

G. blanfordiana NEVILL, *Journ. Asiat. Soc. Beng.*, xxxviii, 1869, p. 158, t. 17, f. 9.—FISCHER, *Coq. Viv.*, p. 265, t. 88, f. 3.

The size mark was omitted on pl. 62, f. 65. Nevill's original figure is copied on pl. 37, fig. 32.

G. cicer Menke. Pl. 62, fig. 75; pl. 26, figs. 18, 19.

Shell perforate or subperforate, globose-conical, solid, whitish, longitudinally striped with reddish or dark brown, the stripes often broken into tessellations on the base; whorls about 5, convex, the first two yellow or rosy, smooth, the remainder coarsely spirally lirate, the liræ about 6 or 7 on the penultimate whorl, separated by deep interstices which sometimes interrupt the stripes of color; spire short; body-whorl rounded; base convex, finely marked with about 8 narrow liræ; aperture subcircular, smooth and white within; columella arcuate, straightened in the middle and oblique, very obsoletely subdentate below; umbilical area small, white or yellowish; base frequently suffused with pink. Alt. 7, diam. 6 mill.

Cape Region of S. Africa.

T. cicer MKE., in PHILIPPI, *Abbild. u. Beschreib.*, i, Trochus, t. 3, f. 5. (1844).—*Conchyl. Cab.*, p. 197, t. 29, f. 24.—FISCHER, *Coq. Viv.*, p. 264, t. 88, f. 2.—*Gibbula musiva* GOULD, *Otia Conch.*, p. 159.—*Leptothyra cicer* PILSBRY, *Manual of Conch.*, x, p. 254, t. 54, f. 62.—*Turbo sanguineus* REEVE, *Conch. Icon.*, t. 12, f. 55? (not of Linn.).—*Turbo roseus* PHILIPPI, *Conchyl. Cab.*, p. 85, t. 19, f. 10(?).

G. cicer is reported from Japan by Schrenck. (*Amurl. Moll.* p. 352.)

G. BENZI Krauss. Pl. 51, figs. 13, 14.

Shell orbicular-conoid, perforate, purplish, maculate with whitish, orange or rose, irregularly transversely costate-striate; whorls 5, convex, separated by a distinct suture, the last ventricose, subangular in the middle; base convex, striate; aperture rotund-quadrate, white within; columella oblique, concave, dilated above; umbilicus profound, narrow. Alt. 8, diam. 9 mill. (*Krauss.*)

Cape of Good Hope.

The transverse striæ are crowded, blunt, and very unequal above, on the base rather regular and elevated. Young examples are

carinated, but old ones have the last whorl rounded, wide and very convex. The columella has a somewhat reflexed margin, which is a trifle widened above, slightly covering the umbilicus; it passes imperceptibly into the outer lip, and is united above with the latter by a very thin white callus. The umbilicus is deep, narrow, longitudinally very finely striated. The color is various; either rose-red or orange-yellow, with traces of clear spots at the suture, or else purple-red with white flecks. (*Krauss*).

T. benzi KRAUSS, Die Südaf. Moll. p. 99, t. 5, f. 32.—PHILIPPI, Conchyl. Cab. p. 320, t. 46, f. 1.

Known to me only by the description (translated above) of Krauss, and his figures (pl. 51, figs. 13, 14), and by Philippi's description and figures of a shell identified by him with this species. Of this form Philippi says:

The shell is pretty thin, conoidal, and consists of 5 whorls which are regularly moderately convex; the last shows an indication of an angle. The sculpture consists of slightly elevated rather narrow transverse liræ, of which I count 4 on the penultimate, about 6 above the periphery of the last whorl, with here and there an intermediate smaller one, and upon the base 10 less elevated ones. The interstices look pitted on account of the elevated incremental striae that cross them. The umbilicus is very narrow, but perforates to the apex, is widened, funnel-shaped at the opening, and is bounded by an obtuse but distinct keel. The color is rose-red with dark red dots. The above-described examples from the Menke collection differ from Krauss' description in color, for his species is said to be purple or orange-red with white flecks; furthermore, the umbilicus, Krauss says, is striate, which is not the case in the specimens before me, which are also more narrowly umbilicated than his figures.

G. SCAMNATA Fischer. Pl. 30, fig. 6.

Shell small, subperforate, conoidal, unicolorous cinereo-olivaceous, with spiral blackish bands; whorls 6, somewhat convex, with 5 to 6 spiral elevated liræ on the penultimate whorl; last whorl subangulate, base convex with 7 to 8 concentric liræ, the interstices narrow; aperture subrhomboidal, sulcate within; columella arcuate, a little reflexed and almost covering the umbilicus.

Alt. 7, diam. $7\frac{1}{2}$ mill. (*Fischer*.)

Oceanica.

T. (Gibbula) scamnatus FISCHER, *Journ. de Conch.*, 1878, p. 66.—*Coq. Viv.*, p. 394, t. 117, f. 4.

G. SMALTATA Fischer. Pl. 32, figs. 72, 73.

Shell small, narrowly perforate, conoid, obtuse; whorls 5, convex, separated by linear sutures; the first whitish; the remainder very finely obliquely striate, shining, very variable in color, sometimes all chestnut or blue, sometimes maculated with green or brown and spirally zoned, the bands linear, narrow, pale, sometimes articulated with brown; penultimate whorl rather tumid, body-whorl angulate, subplanulate below and obsoletely concentrically lirate; aperture subrotund, sulcate within; basal margin arcuate; columella regularly concave-arcuate, nearly closing the umbilical perforation above; umbilical area somewhat funnel-shaped, white, striate, carinate at its margin. Alt. 6, diam. 6 mill. (*Fischer.*)

S. Australia.

T. smaltatus FISCHER, *Journ. de Conch.*, 1879, p. 22.—*Coq. Viv.*, p. 381, t. 115, f. 4.

According to Dr. Fischer, the *T. balteatus* Phil. differs from *T. smaltatus* in its more conical form, flatter whorls, and the columella, which is vertical, not arcuate, and subnodulose, forming an angle with the basal lip.

G. BALTEATA Philippi. Pl. 33, fig. 92.

The shell is solid for its small size, perforate, nearly exactly conical in form, and consists of 6 whorls, of which the upper are almost planulate, while the last, which is as high as all the others together, is bluntly angulated; the upper whorls are encircled around their lower borders by a white girdle articulated with vertical black lines, and which is continued upon the periphery of the last whorl; above this girdle are 5 elevated transverse lines, and upon the base about 12 inconspicuous ones; the columella is almost vertical, rounded, with a slight tubercle in the middle, and forming an angle with the basal lip: the color is pale brown, and besides the above described girdle has large deep brown maculations below the suture; the spiral liræ are punctate with black; the base shows oblique streaks, formed by the coalescence of black dots.

Alt. 7, diam. 6 mill. (*Philippi.*)

Habitat unknown.

T. balteatus PHILIPPI, *Zeitschr. f. Mal.*, 1849, p. 148.—*Conchyl. Cab.*, p. 307, t. 44, f. 10.

Compared by Philippi with *G. racketti* Payr., which is similarly colored, narrower, more ovoid, less conical.

G. SEMINULA Philippi. Pl. 33, fig. 85.

The shell is rather thin, globose-conical; the 5 whorls are moderately convex, the last quite circular, somewhat angular in the middle, but the angle appears much more prominent on account of a thread-like ridge which encircles it. Above this are 4-5 elevated liræ, as wide as their interstices; and upon the base are 9 or 10 liræ, which become narrower and weaker toward the periphery. The umbilicus is very narrow, a mere crevice. The aperture is rhomboidal, with rounded angles; the columella slightly arcuate, simple. The color is red, verging on yellow, with 4 to 5 broad white rays; the apex is white. Alt. $3\frac{1}{2}$, diam. slightly less. (*Philippi*)

Habitat unknown.

T. seminulum PHIL., *Conchyl. Cab.*, p. 308, t. 44, f. 12.

The most similar species is our *T. helicoides* [*G. adansonsii* Payr.], but that species differs in the larger size, wider umbilicus and rounder aperture; at least no transition forms have come under my notice. (*Philippi*.)

G. TIBERIANA Crosse. Pl. 32, fig. 53.

Shell imperforate, conical, rather thin, olivaceous with nacreous reflections, ornamented with flexuous longitudinal grayish streaks; spire moderately elevated; suture impressed; whorls $5\frac{1}{2}$ to 6, subplanate, the last obtusely angulated; base obsoletely striated and covered with spots of grayish-white; aperture oblique, quadrate, inside white, nacreous; columella somewhat expanded; outer margin simple, acute. (*Crosse*). Alt. $4\frac{1}{2}$, diam. $4\frac{1}{2}$ mill.

Coodgee Bay, S. Australia.

T. tiberianus CROSSE, *Journ. de Conch.*, 1863, p. 381, t. 13, f. 2.—FISCHER, *Coq. Viv.*, p. 408, t. 120, f. 2.—*Cantharidus tiberianus* ANGAS, *P. Z. S.* 1867, p. 215.

G. YESSOENSIS Schrenck. Pl. 37, figs. 23, 24; pl. 40, fig. 43.

Shell small, imperforate, conical, rather thin, smooth, shining, light olivaceous, longitudinally marked above with radiating red stripes, with short alternating white maculations at the suture and periphery; upper surface of whorls with three spiral girdles of alternating white and blackish spots, continuous over the longitudinal flames; spire conical, whorls 6, slightly convex, obsoletely lirate, especially at

sutures and periphery ; sutures impressed ; last whorl angulate at the periphery, the angle dividing the shell into two equal parts as regards altitude ; base convex, very finely lirate, the liræ about 12 in number, unicolorous ones alternating with articulated white and deep brown or reddish ones ; aperture large, equalling half the total altitude of shell, subcircular, about as wide as long ; outer lip acute, smooth within ; columella arcuate, a little straightened in the middle ; place of the umbilicus impressed and grooved, but imperforate.

Alt. 7, diam. 6 mill.

Hakodadi, Japan.

T. yessoensis SCHRENCK, Bull. de l'Acad. Imp. des Sci. de St. Petersb. v, p. 512 ; Moll. des Amur-landes u. des Nordjapan. Meeres, p. 353, t. 15, f. 11-18.

An obsoletely lirate, shining species, differing from most others in being imperforate. From *G. tiberiana* Crosse the larger size and coloration separate it.

This species seems to be closely allied to, or identical with *T. callichrous* Philippi. The figure of Philippi is copied on pl. 61, fig. 25 ; the description is as follows :

Shell imperforate, acutely conoidal, very smooth ; whorls slightly convex, the last angulate-carinate ; whorls above and below roseous, articulated with red, in the middle olivaceous with spiral lines articulated with green dots ; base olivaceous, encircled by two similar lines, the center rosy ; aperture subrhomboidal ; columella terete, scarcely oblique, subangular in the middle. (*Phil.*)

A small but extremely beautiful species. The shell is elevated conical, acute, and consists of 7 whorls. These are slightly convex, especially above, and the last (which is 3-7ths the total alt.) has a keel-like angulation. The upper and lower portions of the upper surface of the whorl are finely obliquely striate, rose-red with large brown spots ; the median part of the upper surface is green, approaching olive-color, and is marked by three lines formed of dark green dots. The base is the same color. The center is rose-red, then follows a green girdle with two lines of dark green dots, and the circumference is again rose-red with large brown spots ; the aperture is nearly rhomboidal, white within ; the columella is nearly perpendicular, cylindrical, blunt-toothed in the middle, outside surrounded by an impressed line, which reminds one of an umbilical rimation. Alt. $7\frac{1}{2}$, diam. $6\frac{1}{2}$ mill.

Habitat unknown.

T. callichrous PHIL. Zeitschr f. Mal. 1849, p. 149; Conchyl. Cab., p. 298, t. 43, f. 15.—? *Ziziphinus callichrous* REEVE, Conch. Icon., Monog. *Ziziph.*, f. 60.

Reeve's species is in all probability a distinct thing.

G. JAPONICA E. A. Smith.

Shell wide short conic, deeply perforated, whitish, variegated with dots and spots of brown, base white; whorls 6, nearly flat, encircled by granose spiral liræ, and cut by oblique striæ; last whorl slightly convex above, acutely angulated and carinated in the middle, plane below the carina, and with about 13 concentric granular liræ, the one around the umbilicus larger than the rest. Umbilicus deep, reaching to the apex, smooth; aperture oblique, subquadrate, pearly within; columella slightly thickened, parietal wall with a thin callus. Alt. 5, diam. maj. 8, min. 7 min. (*Smith.*)

Gulf of Yado, Japan, lat. 35° 35' N., long. 139° 48' E., 6-25 fms.

The keel which encircles the body-whorl runs up the spire in the deep suture. Within the umbilicus, and adjacent to the large granular liration which surrounds it, there is another, but much finer one. (*Smith.*)

T. (Gibbula) japonicus E. A. S., Ann. Mag. Nat. Hist. 1875, xvi, p. 110.

G. YAMADANA E. A. Smith.

Shell ovate-conical, dull whitish, painted on the liræ with lilac-brown tessellations, somewhat formed into flammules; slightly perforate; whorls 5, convex, separated by profound sutures, ridged by delicate spiral liræ articulated with lilac-brown (5 to 6 on penultimate, about 20 on the last whorl); with oblique incremental lines; aperture circular, pearly, equalling $\frac{1}{2}$ the total length; columella a trifle thickened; terminations of peristome joined by a thin callus.

Alt. 6, diam. $4\frac{1}{2}$ mill. (*Smith.*)

Yamada Harbor, Japan.

The elongate brownish-lilac spots on the lirations are situated somewhat irregularly underneath each other, so as to form flammulations. (*Smith.*)

T. (Gibbula) yamadanus E. A. S., Ann. Mag. N. H. 1875, xvi, p. 111.

G. CORALLINA E. A. Smith.

Shell coral-red, small, orbicular, rather depressed, deeply but narrowly umbilicated; whorls 4, convex, encircled by close subgranulose liræ, 4 to 5 on the upper whorls, about 20 on the last whorl, and with distant, oblique, longitudinal striæ; umbilicus deep, surrounded by a large ridge sulcated by longitudinal striations; aperture circular, slightly pearly within.

Alt. $2\frac{1}{2}$, diam. 3 mill. (*Smith.*)

Japan.

This is a very pretty little shell with convex whorls, which are spirally striated, the interstitial lirations being somewhat granulous. This appearance is produced by their being cut across by rather distant striations. (*Smith.*)

T. (Gibbula) corallinus E. A. S., Ann. Mag. N. H. 1875, p. 111.

G. FULGENS Gould. Pl. 40, fig. 38.

Shell imperforate or a trifle rimate, globose-conical, rather thick and solid, *vividly iridescent* under a thin brownish cuticle, the reflections chiefly green and golden; spire more or less elevated; apex minute, acute; sutures impressed; whorls about 5, quite convex, the last globose, rounded, encircled by about 16 delicate liræ, above separated by wide interstices, which are lightly obliquely striate, and often spirally striate; on the base the liræ are closer and more regularly spaced, nearly as wide as the interstices. The liræ are either uniform brown or articulated brown and yellowish; there are sometimes short brown flammules below the sutures. The liræ or keels are very widely separated about the middle of the whorl. Aperture subcircular, almost smooth (a trifle sulcate) within, and vividly iridescent; columella arcuate, a trifle dilated at base, and either concealing the perforation above or leaving a narrow chink. Alt. 7, diam. $6\frac{3}{4}$; alt. $6\frac{1}{2}$, diam. 6 mill.

Japan.

G. fulgens GLD., Proc. Bost. Soc. N. H. viii, p. 21 (1861);—Otia Conch., p. 160.—E. A. SMITH, Ann. Mag. Nat. Hist. 1875, p. 110.—*Tr. iridescens* SCHRENCK Reisen im Amurlande, Moll., p. 356, t. 15, f. 19–24; Bull. de l'Acad. Imp. des Sci. de St. Petersb. v, p. 512 (1863); iv, p. 255.

A brilliantly iridescent little shell, quite heavy and solid, having a little the aspect of a *Solariella*, but imperforate. I have seen no other *Gibbula* which shows the iridescence through the cuticle as

this species does. The figure of *iridescens*, copied on my plate, is more elevated than most *fulgens* I have seen.

G. *LACAZEI* Vélain. Pl. 66, figs. 7, 8.

Shell slightly elevated, subcircular, narrowly umbilicated; rather thick, with a very thin epidermis; aperture oblique, nacreous inside; operculum corneous, many whorled; spire composed of 5 whorls, rapidly increasing, presenting (1) a flattened, slightly convex part beneath; (2) longitudinal [i. e. spiral] ridges, quite strong, unequal, with 2 or 3 interstitial, secondary, feeble ridges; (3) transverse [incremental] striae, very fine, regular, close, crossing the other ridges. Aperture oblique, subcircular, nacreous inside; umbilicus small, and often hidden by the extension of the columellar lip. Color a whitish-gray, with rosy and green reflections. Some of the principal ridges are visibly tinged with pale rose.

Alt. $5\frac{3}{4}$, diam. 7 mill. (*Vélain.*)

Island of St. Paul, Indian Ocean.

Margarita lacazei VELAIN, Comptes rendus, 1876; Archives Zool. Expér. et Générale, xvi, 1877, p. 118, t. 4, f. 4-6.—*M. nigricans* VELAIN, *lib. cit.*, t. 4, f. 6.

VAR. *NIGRICANS* Vélain. Pl. 66, fig. 93.

Differs in its smaller size, stronger spiral ridges, and black coloration. Alt. $3\frac{1}{2}$, diam. $6\frac{1}{4}$ mill.

This is of course no *Margarita*. I am not certain of its generic position. It was collected in great numbers by the naturalists attached to the French expedition to the islands of St. Paul and Amsterdam, for observing the transit of Venus in 1874.

G. *GLOBULARIUS* Schrenck. Pl. 69, fig. 10.

Shell depressed-conical, imperforate or obsoletely rimate, olivaceous-brown, spirally lirate with reddish, with here and there whitish undulating rays; whorls 5, planulate, separated by deep sutures, last whorl somewhat convex, subangular; base plano-convex, brown, spirally striate with red; umbilical tract callous, rosy; aperture rounded-quadrangular, the columellar margin very minutely bidentulate, with a little pit between the teeth; outer lip margined with black inside; throat white, pearly. Alt. 7, diam. 9 mill. (*Schrenck.*)

Bay of Hakodadi, Japan.

T. globularius SCHRENCK. Bull. de l'Acad. Imp. Sci. St. Petersb. v, p. 512; Amurlandes Moll. p. 357, t. 16, f. 1-4.

A species of doubtful generic position.

G. REDIMITA Gould.

Shell depressed, orbicular, narrowly perforated, greenish-pearly, iridescent, liræ ornamented with black, the apex white; whorls $4\frac{1}{2}$, rather convex, encircled by 3 or 4 liræ or carinæ (on the last whorl about 12, slenderer below); umbilicus white, small; aperture large, circular, pearly; columella white, somewhat reflexed above, joining the outer lip with a thin callus. Alt. $3\frac{2}{3}$, diam. 4 mill. (Smith.)

Japan (43 fms.)

This very pretty species is at once recognized by its green pearly surface and the black-dotted spiral keels. (Smith.)

G. redimita GLD., Proc. Bost. Soc. N. H. viii, p. 20; Otia Conch., p. 159.—T. (*Gibbula*) *redimitus* E. A. SMITH, Ann. Mag. N. H. 1875, p. 111.

Gould's description is as follows:

Shell small, ovate-conic, ventricose, thin, silvery under a calcareous coat, encircled by remote flat liræ (5 on the spire), pale crimson, the liræ articulated red and white; whorls 7, ventricose, tabulate; base rounded, scarcely rimate; aperture rounded-ovate; columella thin, erect, dilated above, flattened below. Alt. 7, diam. 6 mill.

Hakodadi Bay, Japan.

G. STICTICA A. Adams.

Shell depressed-conical, broadly and deeply umbilicated, reddish, maculated with brown; whorls flat, encircled by white and black articulated cinguli; last whorl angular at the periphery; base convex, concentrically sulcate; aperture orbicular; umbilicus open, perspective. (A. Ad.)

New Caledonia.

Omphalius sticticus A. AD. P. Z. S. 1854, p. 39.

G. DORLE Caramagna. Pl. 51, fig. 27.

Shell conoidal, solid, perforate; whorls $6\frac{1}{2}$, angulate, excavated above, ornamented with granose cinguli with square red spots, and minutely longitudinally striate; cinguli 5 on penultimate, 6 on the last whorl, which is angulate at base; base with 7 concentric cinguli, tessellated red and white. Shell rosy, sometimes olivaceous, ornamented with darker maculations on the last whorl, the cinguli

tessellated; suture nearly filled by the first granose ridge; umbilicus profound, wide, finely striate, lightly cingulate; lip smooth, crenated by the sulci of the outside; columella simple, arcuate, lamellar, twisted at the umbilicus, forming a little canal at the base; aperture subrotund, whitish, rosy. Alt. $6\frac{1}{2}$, diam. 6 mill. (*Caramagna*.)

Assab, on the Red Sea.

G. doriæ CARAMAGNA, Bull. Soc. Mal. Ital. xiii, p. 127, t. 8, f. 3 (1888).

G. TAPPARONEI Caramagna. Pl. 51, fig. 1.

Shell small, turbiniform, very thick; spire short, obtuse, apex mammillated; whorls about 4, the first two smooth, very rapidly increasing, the remainder convex, ornamented with spiral ridges or cords, the ridges costiform, rounded, regular, as wide as the interstices, ornamented with blood-red spots; spots here and there interrupted, sometimes disposed in nearly regular series parallel with the axis, more obscure on the posterior part of the last whorl; interstices between the ridges profound, sulciform, white; last whorl more produced than the spire, quite inflated, rounded at the periphery, depressed on the base, umbilicated; umbilicus very narrow, white, encircled by a white zone; aperture oblique, rounded, simple; peristome with a light thickening; within white, or painted like the outside; suture somewhat impressed, simple.

Alt. 3, diam. 3 mill. (*Caramagna*.)

Assab.

G. tapparonei CARAMAG. Bull. Soc. Mal. Ital. 1888, p. 129, t. 8, f. 5.

G. ISSELI Caramagna. Pl. 51, figs. 5, 6.

Shell conoidal, solid, umbilicated; whorls 5, angular, separated by somewhat deep sutures, canaliculate, granulate, maculate with olivaceous, minutely obliquely striate; obscure subquadrangular spots alternating with white ones on the last whorl; 3d and 4th whorls angular above and below, with 4 cinguli; lower part of last whorl with 17 cinguli; outer lip acute, slightly sulcate at margin, maculate; columella denticulate in the middle; aperture suboval, canaliculate within, whitish pearly; umbilicus narrow, deep, obliquely channelled. Alt. 7, diam. 7 mill. (*Caramagna*.)

Assab.

G. isselii CARAMAG., Bull. Soc. Mal. Ital., 1888, p. 129, t. 8, f. 6.

G. DANIELI Crosse. Pl. 32, figs. 57, 58, 58a.

Shell narrowly umbilicate, depressed conoidal, solid, lusterless, whitish, upper surface spirally banded with dark brown, apex roseate, base light, clouded with brown; spiral low-conoidal, apex acute, sutures well impressed; whorls 5, somewhat convex, spirally coarsely ridged, the ridges not beaded, about 4 to 6 in number above the periphery, more numerous on the base; the whole surface closely, minutely, densely, spirally and radiately striate; last whorl slightly descending at aperture, rounded or subearinate at periphery; aperture quite oblique, rounded-subquadrate; outer lip slightly crenulated, margined inside by a thin opaque white band, silvery and showing folds in the nacre within; columella oblique, sinuous, a little thickened in the middle; umbilicus deep, narrow, bounded by a smooth rib. Alt. 5, diam. 6-6½ mill.

New Caledonia, Viti and Samoa Is.

Clanculus danieli CROSSE, Journ. de Conchyl. 1862, p. 407, t. 13, f. 5.—*Trochus danieli* FISCHER, Journ. de Conchyl. 1875, p. 49; Coq. Viv., p. 326, t. 102, f. 1.—*Gibbula filosa* GARRETT, Proc. Cal. Acad. Sci. iv, p. 201 (1872).

Distinguished from other forms by the red apex, sculpture of fine spiral striæ over coarse liræ, which are not granose. Umbilicus with growth-lines inside, bounded by a smooth rib.

G. REEVEI Montrouzier. Pl. 32, figs. 59, 60.

Shell small, perforate, conoidal, rather solid, blackish-green or olive-brown, marked at the sutures with pale spots, base obsoletely articulated with white and brown; whorls 5, convex, separated by canaliculate sutures, obliquely finely striated, spirally cingulate, the cinguli prominent, 6 to 7 on the penultimate whorl, the upper ridge wider and subgranulose; last whorl subangulate, slightly convex beneath, and encircled by 7 concentric cinguli wider than their finely decussated interstices; aperture rhomboidal, sulcate within; lip thickened, basal margin crenulated; columella oblique, thick, granulose; umbilicus profound. (*Fischer.*)

Alt. 6, diam. 7 mill.

New Caledonian Archipelago.

Trochus reevei MONTR., Journ. de Conchyl. 1866, p. 141, t. 6, f. 8.—FISCHER, Journ. de Conchyl. 1875, p. 49; Coq. Viv., p. 327, t. 102, f. 2.

G. AFFINIS Garrett. Pl. 40, figs. 6, 7.

Shell small, narrowly umbilicate, conoidal, rather solid, lusterless, cinereous, encircled by spiral series of small brown or slate colored subquadrate spots; spire conical, apex whitish, acute, sutures slightly impressed, not canaliculate; whorls 5, slightly convex, the last subcarinate at periphery; surface all over very minutely densely spirally striate, and more or less decussated by growth-lines; with about 5 larger somewhat granose ridges on the penultimate, 12 or more on the last whorl; body-whorl slightly descending anteriorly; aperture rounded-quadrangular, iridescent and sulcate within; basal margin finely crenulate; columella straight in the middle; umbilicus bounded by a coarsely plicate rib, whitish and strongly spirally grooved within.

Alt. 5-5½, diam, 6 mill. Diam. of umbilicus, 1 mill.

Viti and Samoa Is.

G. affinis GARRETT, Proc. Cal. Acad. Sci. iv, p. 201 (1872).

My description and figure are drawn from specimens received from GARRETT.

G. CONCINNA Dunker. Pl. 40, figs. 8, 9.

• Shell small, globose-depressed-conical, narrowly umbilicate, solid, lusterless, soiled whitish or yellowish, with either a series of dark flammules below the sutures, the base faintly articulated with dark, or else the entire surface mottled, nearly covered with blackish. The body-whorl is obtusely subangular, and descends a trifle anteriorly; the sutures are narrowly but decidedly impressed; the penultimate whorl has 7 or 8 equal strong spiral liræ, as wide as the interstices, which are densely obliquely striate and have usually a few indistinct spiral striae. The base has about 10 concentric lirulæ. Aperture rounded, very oblique, thickened with opaque white within, its edge crenulated; umbilicus narrow, bounded by an indistinctly crenulated rib, strongly grooved within.

Alt. 4, diam. 5 to 6 mill.; diam. of umbilicus, ½ mill.

Samoa Is.; Upolu.

The upper one or two liræ are more or less beaded, and sometimes all of them are. The interstices are sometimes wider than the liræ, and have numerous quite distinct spiral striae. The species differs from *G. affinis* Garrett in having subequal liræ, and a narrower umbilicus, scarcely exceeding ½ mill. in width. I have been unable to find any description of this shell; it is mentioned in *Museum God-*

effroy Catalog V, p. 147; *Cat. der Conchyl.-Samml. von Fr. Puetel*, 8te lieferung, p. 569; *Proc. Cal. Acad. Sci.* iv, p. 201, and several other places, but nowhere can I find a reference to the description. It was probably never described. The form is very close to *G. affinis* and *G. reevei*.

G. STRANGEI A. Adams. Pl. 32, figs. 61, 62.

Shell small, narrowly umbilicate, globose-conical, rather thin, lusterless, olive colored, with scattered white dots, and obliquely radiating brown flames below the sutures, the spiral ribs with minute brown dots; spire conical, acute; sutures subcanaliculate; whorls 5, convex, encircled by strong spiral ridges, 3 on the upper, 4 on the last whorl, the fourth forming the periphery; interstices spirally striate, below the suture radiately lamellose striate; base with numerous concentric liræ; a patch around the umbilicus white, articulated with brown; aperture subquadrangular, iridescent and sulcate within; columella straight, usually green tinged.

Alt. 6, diam. 6 mill; alt. 10, diam. 8 mill.

Port Jackson, Australia.

G. strangei A. AD., P. Z. S. 1867, p. 217.—*Trochus strangei* FISCHER, Coq. Viv., p. 329, t. 102, f. 3.

The strong keels of the upper surface separate this form from allied species.

G. COXI Angas. Pl. 31, figs. 34, 35; pl. 32, fig. 69.

Shell orbicularly conical, moderately umbilicated, rather solid, whitish, marbled with olive and pink, and with a few broad pure white flames descending from the sutures and interrupted on the keels with brownish red; base reticulated with gray and minutely spotted with red; spire conical; whorls 5, angular, with two prominent rounded keels, one next the suture; concave between the suture and upper keel, and a little concave between the keels, finely spirally ridged and decussated with exceedingly fine and close oblique longitudinal lines; base convex, finely concentrically ridged and decussated like the whorls, the ridges increasing in size toward the umbilicus. (Angas.) Alt. 8, diam. 10 mill.

Port Jackson, Australia.

Gibbula coxi ANGAS, P. Z. S. 1867, p. 115, t. 13. f. 26.—*T. coxi* "A. AD." FISCHER, Coq. Viv., p. 339, t. 105, f. 3.

A globose-conoid species, with two strong rounded keels, the whole surface covered with fine spiral striæ. One of the specimens before me from BRAZIER has no color markings.

G. OPPRESSA Hutton. Pl. 40, figs. 4, 5.

Shell small, imperforate (or with a shallow "false umbilicus"), conical, somewhat solid, lusterless, dark olive-brown or greenish, minutely tessellated all over with a slightly darker shade of the same hue (scarcely visible unless the shell be wetted); whorls about 5, convex, those of the spire keeled in the middle, body-whorl biangular, base rather flattened; entire surface closely finely spirally striate, the striæ of base becoming coarser toward the axis; aperture oblique, quadrangular, smooth within and brilliantly iridescent, the nacre dark green with red reflections; lip slightly thickened by a narrow opaque margin within, not crenulated; columella oblique, straight, long, inserted in the center of the base; umbilicus filled with callus, leaving only a slight pit. Alt. $5\frac{1}{2}$, diam. 6 mill.

Auckland, N. Z.

G. oppressa HUTTON, Journ. de Conchyl. 1878, p. 34; Proc. Linn. Soc. N. S. W. 1884, p. 364; Trans. N. Z. Inst. xv, t. 14, f. m. (dentition).

My description and figure are drawn from a specimen received from Professor HUTTON. The imperforate axis separates this form from the preceding biangulate Australian *Gibbula*.

G. PRASINA Garrett. Pl. 40, figs. 14, 15.

Shell minute, perforated, globose-depressed, rather thin, scarcely shining, light olive-green, mottled closely with dark greenish, the whole surface, save a circum-umbilical tract, often uniform blackish-green; spire very short, formed of 4 very rapidly widening whorls separated by well-marked sutures; the whorls spirally lirate except on the base, the liræ slightly crenulated by indistinct oblique growth marks; aperture very large, very oblique, rounded, the extremities of peristome nearly joining, connected by a short parietal callous; columella and basal margins equally curved, simple and smooth within; umbilicus quite narrow.

Alt. $2\frac{1}{2}$, diam. $3\frac{1}{2}$ mill.; alt. 3, diam. 4 mill.

Viti Is.

Gibbula prasina GARRETT, Proc. Cal. Acad. Sci. iv, p. 202.

A curious little form, quite distinct from any other known to me. The figure and description are from specimens received from GARRETT.

G. SATORIUS Deshayes. Pl. 40, fig. 23.

Shell turbinate, subglobose, conoidal, blackish-brown, transversely very finely lirate, liræ unequal, mostly punctate very regularly with white; spire short, acute; whorls 6, slightly convex, separated by linear sutures, slowly widening, the last large, globular, angular at the periphery, obtuse below; base profoundly perforate; aperture subcircular, very oblique, white; columella cylindrical, slightly tortuous. Alt. 6, diam. 6 mill. (*Desh.*)

Id. Réunion.

T. satorius DESH. Moll. de l'Ile de la Réunion, p. 72, t. 9, f. 7, 8.

G. STRIATA Garrett.

Shell small, rather thin, globosely conical, grayish-brown, rarely crimson, delicately mottled with whitish; whorls 5, convex, last one gibbose, subangulated at the periphery, closely lineated with large, unequal sized, elevated spiral striae; umbilicus whitish, small, with deep spiral grooves within; aperture roundly subquadrate, pearly white, outer lip rather thin. Alt. 4, diam. 5 mill. (*Garrett.*)

Viti and Samoa Is.

G. striata GARRETT, Proc. Cal. Acad. Sci. iv, p. 201 (1872).

According to Garrett this is a very rare species. I have seen no specimens.

G. LEHMANNI Menke. Pl. 40, figs. 12, 13.

Shell umbilicate, rather thin, orbicular-conoid; whorls 6, separated by impressed sutures, the first eroded, the following angular, flattened above, gradate, strikingly painted, spirally lirate, liræ delicate, about 12 on the penultimate whorl; last whorl dilated, biangular, ornamented with transverse white and reddish-violet interrupted lines, like flexuous rays; at the suture and periphery there are zones formed of violet-brown spots alternating with white or yellowish ones; base convex, with 15 to 16 concentric liræ; coloration white and reddish tessellated; aperture subovate, margins thin; columella arcuate, subnodose inside below; umbilical tract white, funnel-shaped. Alt. $7\frac{1}{2}$, diam. 9 mill. (*Fischer.*)

Western Australian coasts.

Turbo lehmanni MENKE, Moll. Nov. Holl., p. 18.—*Trochus lehmanni* PHILIPPI, Conchyl. Cab., p. 185, t. 28, f. 15.—FISCHER, Coq. Viv., p. 362, t. 111, f. 3 (not *Trochus lehmanni* Menke, Moll. Nov. Holl., p. 18, nor *T. lehmanni* Kiener, Spec. genre Trochus, t. 46, f. 2).—*Gibbula pulchra* A. AD., P. Z. S. 1851, p. 187.

G. TESSERULA Tenison-Woods. Pl. 32, figs. 66–68.

Shell small, shining, obliquely depressed, deeply umbilicated, thin, blackish, with a kind of a purple iridescence, conspicuously marked with a line of large square black and white spots at the periphery; whorls $3\frac{1}{2}$ to 4, convex, regularly and distantly spirally striate, decussate transversely with close fine lines. Outer lip thin, crenulate, inner lip reflexed and curved, scarcely separated from the labrum; aperture subquadrate, tessellate inside with a fine iridescent film; base smooth, polished and convex.

Alt. 4 mill. (*T. Woods.*)

The depressed form of this shell and its conspicuous tessellations distinguish the species from the many forms of *Gibbula* we have in the Australian Seas. *G. depressa* described by me is a dark tessellated form, but it is widely sulcate. (*T.-Woods.*)

G. tesserula T.-WOODS, Trans. and Proc. Roy. Soc. Victoria, xvii, 1881, p. 81, t. 1, f. 3–5.

The figures of this shell are much enlarged. Tenison-Woods does not give the locality, but it is presumably Tasmania or Eastern Australia.

G. DEPRESSA Tenison-Woods. Pl. 40, figs. 36, 37.

Shell narrowly umbilicate, depressed, thin, lusterless, whitish, mottled and somewhat radiately streaked with blackish-brown and crimson, periphery whitish, with or without a series of dark blotches; base olive or brown, sometimes tessellated with a darker shade; spire very low, short; apex minute, subacute; sutures narrowly impressed; whorls about 4, *the last very rapidly widening*, with several (6 or fewer) coarse but superficial spiral liræ above, and about 6 narrower, still less conspicuous ones beneath; periphery more or less distinctly biangular; aperture large, subquadrangular, quite oblique; iridescent and sulcate within, the lip thin, fragile, bordered inside by a thin opaque band; columella thin, a little straightened, umbilicus narrow, not bounded by a distinct rib or carina, smooth within. Alt. 4, diam. $6\frac{1}{2}$ mill.

Tasmania.

G. depressa TENISON-WOODS, Proc. Roy. Soc. Tasm. 1875, p. 154.

G. DOLOROSA Tenison-Woods.

Shell small, turbinate-conoid, solid, lirate, slightly shining, blackish-purple, apex pearly, rosy; whorls 4-5, slightly convex, encircled by wide rounded equal liræ, and decussated by oblique, obsolete incremental striæ; base convex, lirate, purple; umbilicus narrow, longitudinally striate; aperture rounded, brilliantly iridescent, lirate within; columella margined.

Alt. 7, diam. 7 mill. (*Tenison-Woods.*)

Bass' Straits.

A somewhat tumidly conical small solid shell, umbilicate and lirate, specially distinguished by its blackish-purple hue, while the apex is pearly and rose color. The mouth is splendidly iridescent, and the columella is marginate. (*T.-Woods.*)

G. dolorosa TENISON-WOODS, Proc. Roy. Soc. Tasm. 1876, p. 143. (1877).

G. PHASIANELLA Deshayes. Pl. 31, figs. 31, 32, 33.

Shell small, globose-turbinate, narrowly perforate, thin, smooth, shining, marbled and mottled with various shades of olive, brown and pinkish, usually showing dots of white, or spiral lines of white and pink or brown articulated; spire short, conical, apex minute, acute, sutures impressed; whorls about 5, rounded, the last large, convex below, indented around the narrow white umbilicus; aperture rounded-oval, with a very thin layer of bluish iridescent nacre within, oblique; outer, basal and columella margins well curved, thin, simple, converging and united across the parietal wall by a thin layer of callus. Alt. 6, diam. 6 mill.; alt. 4, diam. 4 mill.

Id. of Réunion; Art, New Caledonian Archipelago; Lifu, Loyalty Archipelago.

Turbo phasianellus DESH., Conchyl. de l'Ile de la Réunion, p. 74, t. 9, f. 13, 14.—*Trochus phasianellus* FISCHER, Journ. de Conchyl. 1874, p. 156, and 1875, p. 49; Coq. Viv., p. 363, t. 111, f. 4.

This beautifully variegated little shell is closely allied to *G. tasmanica* Petterd differing in the smoother, polished surface and coloration. The rich, mottled color-pattern is like some specimens of *Turbo petholatus* L. It is the type of Fischer's subgenus *Calliotrochus*, a section which includes also *G. tasmanica* and probably some other small species.

G. AMIRANTIIUM Smith. Pl. 67, figs. 65, 66.

Shell small, subglobose, perforate, spirally finely lirate and sulcate, white, the liræ being interruptedly pink; whorls 4-5, convex, rapidly increasing; last whorl rounded at the periphery, lirate throughout, the liræ rather narrower than the intervening grooves and crossed by the lines of growth. Aperture circular, occupying more than half the total height of the shell. Columella arcuate, white, covered with a callous, which is considerably reflexed, especially at the lower part. Alt. 4, diam. $4\frac{1}{3}$ mill. (Smith.)

Etoile Island, Amirantes, 13 fms.

Trochus (Gibbula?) amirantium E. A. SMITH, Zool. 'Alert' p. 504, t. 44, f. v.

The distinguishing feature of this little species is the reflexed character of the columella. (Smith.)

G. WELDII Tension-Woods.

Shell small, depressed-turbinate, carinated, rather widely umbilicate, solid, shining, whitish, elegantly ornamented with slender oblique lines and brown spots; whorls 5, quadrate, carinated above and below, the carinæ rounded, elevated, conspicuously spotted with fulvous; all over (except the carinæ and the space between them on the last whorl) lirate; apex obtuse; base flat, striate, with radiating rose colored lines; aperture rounded, peristome continuous, thickened; columella arcuate, conspicuous; umbilicus margined, margin white, within marked with spiral equal liræ.

Long. 7, lat. $6\frac{1}{2}$, alt. 6 mill. (*Tension-Woods.*)

Bass' Straits.

A small depressedly turbinate shell, white, shining and porcellaneous, keeled and lirate throughout except on the keels and on the last whorl between them. It is prettily marked with brown spots on the keels and fine diagonal lines of the same color on the whorls; on the base which is lirate it is radiately marked with fine rose lines. The umbilicus is white margined and spirally lirate. Rare. This shell may turn out to be *G. porcellana* A. Ad., but I had no specimen of the latter for comparison. (*Tension-Woods.*)

G. weldii T.-WOODS, Proc. Roy. Soc. Tasm. 1876, p. 143 (1877.)

G. TASMANICA Petterd. Pl. 40, fig. 20.

Shell small, perforate, globose-turbinate, rather thin, lusterless, whitish, tinged with yellow or greenish, unicolored or marked with a

few angular radiating maculations of blackish-brown; spire very short; sutures impressed; whorls about $4\frac{1}{2}$, convex, rounded, all over finely regularly spirally lirulate; last whorl rounded at the periphery, or very bluntly subangular, convex beneath, impressed around the umbilicus; aperture quite oblique, rounded-ovate, angular above, broadly rounded below, with a thin iridescent layer of nacre within; outer, basal and columellar margins rather thin, curved, the latter joined to the upper margin by a thin white parietal callous; umbilicus not bounded by an angle, narrow.

Alt. $5\frac{1}{2}$, diam. $5\frac{1}{4}$; alt. 6, diam. $5\frac{1}{2}$ mill.

Brown River, Tasmania.

G. tasmanica PETTERD, Quart. Journ. Conch. (Leeds) ii, p. 103 (1877).

This dull whitish little shell may be known by its finely striate surface, narrow umbilicus, short spire and globose-turbinate form.

G. AUREA Tension-Woods.

Shell small, turbinate conical, scarcely umbilicate, yellowish-white, painted very prettily with reddish gold spots; whorls 4, margined at the base, and flattened, rounded above and constricted at the sutures; girded by irregular obliquely striate very fine striae; margin elegantly tessellated with white and reddish gold; base sculptured with impressed tessellated lines; aperture rounded. Very nacreous underneath. Alt. 5, diam. 4 mill. (*Tension-Woods.*)

Kings Island, Tasmania.

G. aurea T.-WOODS, Proc. Roy. Soc. Tasm. 1875, p. 153 (1876.)

The Academy received shells under this name from Mr. Beddome, (Pl. 40, fig. 17) but I am not at all sure that they really represent Mr. Tension-Woods' species.

G. OCHOTENSIS (Middendorf) Philippi. Pl. 60, figs. 3, 4.

Shell globose-conoidal, narrowly umbilicate, closely transversely sulcate, blackish; whorls convex, the last subangulate; base convex, rounded toward the umbilicus; spiral lines about 11 on the penultimate, 30 on the last whorl; aperture rhombic-orbicular; columella oblique, sub-excavated above, rounded; beautifully nacreous, greenish. (*Phil.*)

The shell is orbicular-conical, consisting of 5 regularly convex whorls, the last indistinctly angular at the periphery, convex beneath, and notably convex near the umbilicus. Umbilicus very narrow, and while it perforates to the apex, one can hardly get the finest

needle through it. The sculpture consists of numerous elevated transverse lines. On one specimen there are 11 on the penultimate whorl, rather strongly elevated, scarcely half as wide as their interstices; on a second there are about 30 much weaker ones; on both the base is more densely striate than the upper surface. The aperture is rounded, slightly quadrangular; the outer lip is simple; the columella oblique, arcuate, passing into the outer lip, and is strongly incurved above, as in the related species. The color is blackish-gray unicolored in the thickly striate specimen; the other (here illustrated) has obliquely longitudinal coalescing dashes on a clear ground. This coloration affects only a very thin layer, beneath which lies a beautiful nacre, with play of golden and green tints.

Alt. 16, diam. 18 mill. (*Philippi*.)

Okhotsk Sea.

T. ochotensis (Middendorf *in litt.*) PHILIPPI, *Conchyl. Cab.*, p. 222, t. 34, f. 1.

I do not know the generic position of this species.

G. ZONATA Wood. Pl. 36, fig. 21; pl. 64, fig. 38.

Shell imperforate but excavated at the place of the umbilicus, depressed-conical, rather solid, whitish, with numerous spiral bands and lines of purplish-brown; surface very lightly obliquely striate, closely, densely finely spirally striate, generally with three strong carinae, one at periphery, the others above; whorls about 5, convex, those of the upper surface bicarinate; last whorl convex, carinate or subcarinate; aperture rounded-quadrangular, oblique, nacreous inside with slight sulci at the positions of the external carinae; columella a little straightened. Alt. 7, diam. 8 mill.

Cape of Good Hope.

Tr. zonatus WOOD, *Index Test. suppl.* t. 5, f. 34.—KRAUSS, *Die Südaf. Moll.*, p. 97.—PHILIPPI, *Conchyl. Cab.* p. 287, t. 42, f. 8.—VON MARTENS, *Jahrb. d. Mal. Gesellsch.* 1874, p. 129, 142.—WATSON, *Challenger Gasterop.* p. 76.—*T. cingulatus* MUHLF., *Mag. d. Gesellsch. Naturf. Freunde, Berlin*, viii, 1818, pl. 2, f. 11, (not *cingulatus* Brocchi).—*T. menkeanus* PHIL. *Abbild. u. Beschr.* i, p. 91, t. 21, f. 6; ii, p. 39.—*T. cingulatus* (again) MENKE, *Syn. Meth.*, p. 55, 143.—*T. leaensis* WATSON, *Journ. Linn. Soc. Lond.*, xv, p. 90.—“*Cymatia cingulata*” MUHLF. in coll. (Specimens sent to I. Lea, 1835, now in A. N. S. P. coll.)

A small form, distinct from other Cape *Gibbula* in its fasciate color-pattern. There is great variation in the prominence of the spiral carinae. Lischke classes it as a *Photinula*, and it certainly bears a considerable resemblance to that group.

G. CAPENSIS Gmelin. Pl 31, figs. 36, 37.

Shell narrowly umbilicated, conoid-depressed, whorls 5, the first roseate, eroded, the following convex above, depressed beneath, whitish or rosy, flammulate with brownish-violet radiating maculations, obliquely striate and spirally liriate, the liræ flat, narrow, not granose; last whorl dilated, subangulate above, depresso-carinated at the periphery, convex beneath and ornamented with 9 concentric reddish lire; aperture oblique, subquadrate; lip simple; columella arcuate, denticulate at base, slightly calloused above, almost covering the umbilicus. Alt. 12, diam. 17 mill. (*Fischer.*)

Cape of Good Hope.

T. capensis GMEL. Syst. Nat. xiii, p. 3573.—KRAUSS, Die Sudaf. Moll., p. 100.—PHILIPPI, Conchyl. Cab. p. 196, t. 29, f. 22.—FISCHER, Coq. Viv. p. 311, t. 98, f. 3.

A conical flat-based species, often more decidedly radiately striped than the figures represent.

G. TRYONI Pilsbry. Pl. 69, figs. 20, 21.

Shell conical, umbilicate, rather thin, crimson or purplish red, obscurely, rather finely mottled with arrow-shaped whitish dots, usually with several narrow articulated lines on the base, and in the middle of the upper surface of the last whorl; apical whorls eroded, yellow; spire conic; whorls 5, a little tumid below each suture, and with a narrow ledge or margin, marked off by an impressed line, above each suture. This peripheral ledge gives the last whorl a rather prominent keel; the surface is polished, but shows quite prominent, spaced, impressed growth-lines, and under a lens is all over very densely minutely spirally striate; the base is flattened, rather prominent around the umbilicus; aperture oblique, quadrangular, smooth and with a very brilliantly iridescent green nacre inside; columella arcuate above and expanded partly over the umbilicus; parietal wall free from callus; umbilicus deep, with a narrow rapidly tapering perforation, but broad and funnel-shaped at the opening. Alt. 12, diam. 14 mill.; alt. 13, diam. 13½ mill.

Cape of Good Hope.

Has the aspect of *G. richardi* on the base, but is more narrowly umbilicated and has smaller, less oblique aperture. The ledge on the periphery is like that of *G. magus*, *G. albidus*, and other species of the typical group. The color is sometimes pale purplish red; mottled with light green, and with broad subsutural darker flames, sometimes it seems nearly unicolored crimson above. The mottlings will however be seen under a lens. The base is always lighter colored. The principal peculiarity of sculpture is the fold-like oblique striation, and the very dense microscopic striation of the whole surface.

G. MULTICOLOR KRAUSS. Pl. 62, fig. 83.

Shell small, narrowly perforated, conoidal, whorls 5, the first whitish-rosy, the following white, with reddish flammules and spots of green and bluish, especially at the ridges; The surface of the whorls is marked with very fine spiral and vertical striæ, and 2 elevated carinæ; last whorl tricarinate, base red with a spiral series of green streaks, concentrically striate; aperture suboval, smooth within; columella white. Alt. $6\frac{1}{2}$, diam. 7 mill. (*Fischer.*)

Cape of Good Hope

T. multicolor KRAUSS, Die Sudaf. Moll., p. 97, t. 5, f. 31.—PHILIPPI, Conchyl. Cab., p. 321, t. 46, f. 3.—FISCHER, Coq. Viv. p. 316, t. 99, f. 3.

G. PONSONBYI Sowerby. Pl. 65, fig. 76.

Shell subglobose, narrowly umbilicate, rather thin, pale, maculated with brown at the base, whorls 5, convex, rapidly increasing, first two smooth; the rest angulated, coronated on the angle with a series of tubercles, above the angle spirally tri-sulcate, below obscurely lirate. Last whorl inflated, coronated with a series of (about 12) tubercles; below the corona uni-lirate, at base convex, ventricose, rounded, furnished with about 8 rather acute liræ. Aperture semi-lunar; columella lightly callous, contracted above, turgid below the middle.

Alt. $13\frac{1}{2}$, diam. 14 mill.; aperture, alt. 9, breadth 7 mill. (*Sowb.*)

In the absence of operculum it is impossible to say with certainty to what genus or section this species belongs, though I have little doubt it will prove a *Gibbula*. The base is unusually convex and ventricose, the spire rather shortly conical, and the upper angle coronated with rounded tubercles. The mouth is rather wide, and the umbilicus narrow. The spiral ridges on the base are rather

close, and the upper ones distant. (*Sowb.*) Described from a single dead specimen.

Port Elizabeth, S. Africa.

Tr. (Gibbula) ponsonbyi SOWB., P. Z. S. 1888, p. 209, t. 11, f. 5.

G. VULNERATA Philippi. Pl. 51, figs. 10, 11.

Shell conoidal, imperforate, transversely sulcate-cingulate, yellowish, painted with oblique blood-red streaks; whorls convex, the last scarcely angular; aperture rhombic-rounded; columella very oblique, cylindrical, simple. (*Phil.*)

The shell is rather thick, imperforate, conoidal; the 6 whorls are convex, the last scarcely angular, with 7 to 8 transverse sulci, which are as broad as the ridges lying between them; the base is similarly traversed by the same number of sulci. There is scarcely a trace of umbilicus to be seen. The aperture is rhombic-circular, and appears somewhat contracted on account of the very thick lip; the columella is very oblique, cylindrical, straight; the color is yellowish, regularly marked with oblique blood-red streaks.

Alt. $11\frac{1}{3}$, diam. $11\frac{1}{3}$ mill. (*Philippi.*)

Habitat unknown.

T. vulneratus PHIL. Zeitschr. f. Mal. 1850, p. 16; Conchyl. Cab. p. 305, t. 44, f. 7.

G. PISUM Philippi. Pl. 31, figs. 38, 39, 40.

Shell perforate, turbinate-conic, rather solid, lusterless, reddish, with white radiating flammules above, more or less dotted with white beneath, and with (usually) a white umbilical tract; spire conical, apex acute, sutures narrowly canaliculate; whorls about $4\frac{1}{2}$, the last biangular, its upper surface spirally lirulate, the subsutural spiral prominent, followed by about 4 smaller ones; periphery biangular from two encircling strong liræ, with an equal or slightly smaller one between them, on each side of which is a minute spiral; base with 5 to 7 concentric liræ; interstices all over obliquely crispate-striate; aperture subcircular, smooth within; columella arcuate, white. Alt. $5\frac{1}{2}$, diam. 6 mill.

West Indies.

T. pisum PHILIPPI, Zeitschr. f. Mal. 1848, p. 111; Conchyl. Cab. p. 205, t. 30, f. 11.—*T. gradatus* GOULD, Proc. Bost. Soc. N. H. iii, p. 91 (1849); U. S. Expl. Expedition Moll., p. 175, f. 210.

A well-marked species, of which numbers of specimens are before me. Dr. Gould gives "Pacific Is." as the locality of *T. gradatus*

(pl. 31, figs. 38, 39, 40) which I take to be the same species. I have specimens found among small West Indian shells. The young are very similar to certain species of *Liotia*. They are strongly bicarinate, the carinæ with radiating short spines; there is a subsutural granose ridge, and a similar one bounds the umbilicus. I am not certain that the species is a *Gibbula*. A specimen of this species is drawn in figs. 2, 3, pl. 45 of vol. x of the *Manual*.

G. ROSEUS KRAUSS. Pl. 40, fig. 38.

Shell small, globose-conoid, imperforate, thin, roseate, unicolorous or marked with white flammules; whorls terete, transversely cingulate, cinguli 3 on the penultimate whorl, the interstices much wider, striated; base closely lirate; aperture rhombic-orbicular, columella oblique. (*Phil.*)

The shell is wholly imperforate in my examples, with only a slight impression at the place of the umbilicus, rather thin, globose-conoidal, acute, formed of 5 convex, strongly separated whorls. These on the upper part are encircled by 3 narrow ridges, their broad interstices traversed by 2 to 4 elevated lines; the rounded base has about 7 to 9 close spiral liræ with narrow interstices. The aperture is almost circular, scarcely quadrate; the columella oblique, scarcely straight. The color is rose-red, with darker girdles or with white flecks, or with radiating flames above.

Alt. 6, diam. 6 mill. (*Philippi*.)

Cape of Good Hope.

T. roseus KRAUSS, Die Sudaf. Moll. p. 97.—PHILIPPI, Conchyl. Cab. p. 198, t. 29, f. 26. (? *Globulus roseus* Chemnitz, ? *T. roseus* Gmel.)—*T. gaudiosa* GOULD, Proc. Bost. Soc. N. H. viii, p. 21.

I identify this shell with specimens before me marked *G. gaudiosa* Gld., which agree well with Philippi's description.

Unfigured, Undetermined Species.

G. LOCULOSA Gould. *T. parva*, globoso-conica, depressa, sub-tenuis, rosaceo fusco etc. et strigis radiantibus flavidis variegata; anfr. 5, ventricosis, liris 5 et filiis minoribus 1-3 ad interspatia exiliter clathrata cinctis; liris lævibus, coloribus articulatis; sutura profunda; basi rotundato concentrice arato; regione umbilicali pallide, arcte perforata; apertura rotundato ovata; fauce margaritacea, sulcata.

Alt. 6, diam. 7 mill. (*Gould, Proc. Bost. Soc. N. H. vii, p. 21.*)

False Bay, Cape of Good Hope.

G. MUSIVA Gould. T. parva, ovato-globosa, tenuis, liris transversis ubique cineta, luteo nigro ordinatim tessellata; anfr. 5, convexis; basi imperforato (junioribus exceptis); apertura rotundato-ovato; columella incrassata, antice subdentata; fauce naerea, sulcata;

Diam. 6 mill. (*Gould, Proc. Bost. Soc. N. H. viii, p. 21.*)

Simon's Bay.

G. FUCATA Gould. T. parva, orbicularis, depressa, supra lævis, infra concentrice striata, livido-cinerea, strigis rubris vel fuscis saturatiori marginatis ad peripheriam angulatis et subtus interdum tessellatis variegata, suberusta calcarea iridescens; anfr. 5, declivibus; sutura conspicua; basi arcissime perforato; apertura ampla, ovata; columella arcuata, subreflexa.

Alt. 5, diam. 7 mill. (*Gould, Proc. Bost. Soc. N. H. viii, p. 20.*)

Habitat unknown.

G. SULCOSA A. Adams. T. conoidea, umbilicata, maculis roseis flammulis albo-punctatis variegata; anfr. paulum convexis, longitudinaliter substriate, transversim sulcate, sulcis subdistantibus, anfractu ultimo subangulato, basi convexiuscula, lineis impressis concentricis sculpta; apertura suborbiculari; columella superne sinuata, basi subtruncata. (*A. Ad. P. Z. S. 1851, p. 186.*)

Sir C. Hardy's Id., N. Australia, 8 fms.

G. MINDORENSIS A. Adams. Testa elevato conoidea, perforata, viridi-fusca, fasciis pallidis longitudinalibus ornata; anfractibus rotundatis, liris transversis subgranulosis cinetis, ultimo subangulato, basi convexa; columella subrecta, basi tuberculo terminata; labro intus sulcato. (*A. Ad., P. Z. S. 1851, p. 186.*)

Puerto Galero, Id. of Mindoro, 9 fms.

G. UNDOSA A. Adams. T. orbiculato conoidea, umbilicata, vire-scenti, lineis fusco-viridibus undatis longitudinaliter picta; anfr. rotundis, transversim tenue liratis, ultimo subangulato, basi convexa; apertura expansa, intus iridescenti; columella superne sinuata, basi rotundata. (*A. Ad. P. Z. S. 1851, p. 186.*)

Habitat unknown.

G. KALINOTA A. Adams. T. orbiculato-conoidea, perforata, vire-scenti, carneo-cinereo variegata; anfr. rotundatis, lineis elevatis albo-articulatis, superne gibbosis; sutura profunda, anfractu ultimo rotundato, basi convexa, cingulis articulatis concentricis ornata,

marginē umbilici angulato, lineā elevata cincto, columella superne sinuata, basi subtruncata; labro intus levi. (*A. Ad. P. Z. S.* 1851, p. 187.)

Habitat unknown.

G. VENUSTA A. Adams. T. orbiculata-conoidea, umbilicata, viridi-fusca, maculis albis prope suturas, cingulis subdistantibus fusco rubroque articulatis, interstitiis liris, longitudinaliter oblique striata; anfractibus superne gibbosis, rubro pictis; sutura canaliculata; anfractu ultimo rotundato, basi convexiuscula, cingulis fusco-alboque articulatis, regione umbilicali rosea picta; columella sinuata, basi truncata. (*A. Ad. P. Z. S.* 1851, p. 187.)

Australia.

G. PUNCTOCOSTATA A. Adams. Testa turrato-conica, lutescenti, umbilicata; anfractibus superne cingulis tribus nodulosis, rubro-articulatis, infra cingula puncto-nodosa, basi plana, cingulis concentricis subnodosis rubro-articulatis ornata, marginē umbilici lineā elevata cincta; columella subrecta, basi truncata; labro intus lirato. (*A. Ad. P. Z. S.* 1851, p. 187.)

Id. of Capul, on the reefs at low water.

G. LEUCOSTICTA A. Adams. T. conoidea, perforata, nigra, punctis lacteis picta; anfr. convexiusculis, transversim lirata, longitudinaliter striata, liris subdistantibus, albo-punctatis, interstitiis lineis elevatis transversis ornata; anfr. ult. angulato, basi convexiuscula, cingulis nigro alboque articulata; apertura subrotundata; columella superne sinuata, basi rotundata. (*A. Ad., P. Z. S.* 1851, p. 187.)

Bohol, Philippines.

G. NIVOSA A. Adams. T. orbiculato-conoidea, umbilicata, cinerea, maculis nivosis subrotundatis picta, transversim sulcata, longitudinaliter substriata; apertura subrotundata; columella flexuosa, basi rotundata. (*A. Ad., P. Z. S.* 1851, p. 187.)

Habitat unknown.

T. LYCIACUS Forbes. T. testa conoidea, lata, albida, purpureo-maculata (ad umbilicem flammulata); anfr. 5-6, spiraliter sulcatis, sulcis transverse striatis, ad suturam planatis, in medio excavatis; basi plano, marginato; umbilico parvo; apertura quadrangulari, columella incrassata.

Al. 7-24ths, diam. 9-24th inch. (*Forbes*).

Lycia, Peræa.

E. FORBES, *Rep. Brit. Asso. Advancem. Sci.*, 1843, p. 189 (published 1844.)

Subgenus ENIDA A. Adams, 1860.

Enida A. AD., Annals and Magazine of Natural History, 1860, p. 408.—FISCHER, Manuel de Conchyliologie, p. 824.

"I have dedicated this genus to the gentle Lady Enid of the Poet-Laureate's 'Idylls of the King,'—a creation of the brain more beautiful, more tender, and more pure than any of the so-called goddesses of the Greek mythology who have lent their names to science. *Enida*, founded on shells of great beauty and of exquisite sculpture, resembles a depressed and widely umbilicated *Ziziphinus* with the inner lip reflexed; in form it also approaches many species of *Gibbula*, but this group is littoral and coarser in its physiognomy. Deep-water shells are usually more delicate and of finer sculpture than those which have to buffet with the tides." (*A. Adams.*)

G. JAPONICA A. Adams. Pl. 67, figs. 44, 45.

Shell depressed-conical, profoundly umbilicated; whorls $5\frac{1}{2}$, slightly convex, ornamented with transverse granulose liræ, the interstices obliquely longitudinally striated; last whorl encircled by a prominent crenulated carina at the periphery; aperture subquadrate, inner lip reflexed in the middle, outer lip smooth within; base with close granulose liræ; umbilicus moderate; color pale brown, ornamented with radiating brown patches. (*A. Ad.*)

Off' Mino-Sima, Japan. 63 fms.

Enida japonica A. AD. Ann. and Mag. N. H. 1860, p. 408.—DUNKER, Ind. Moll. Mar. Jap., p. 144, t. 12, f. 17, 18.

This appears to be the most abundant species, but all the specimens I obtained in the dredge were dead shells. In this species and *E. speciosa* the inner lip is smooth within, but in *E. gemmulosa* it is internally thickened and lirate and crenate at the margin; in *E. japonica* the aperture is also less circular in its outline. (*A. Ad.*)

G. SPECIOSA A. Adams. Unfigured.

Shell depressed-conical, broadly umbilicate; whorls $4\frac{1}{2}$, nearly flat, angulated at the sutures, with rather close transverse granulose liræ, the interstices elevately, obliquely striate; last whorl ornamented on the periphery with a deeply crenulated rib; aperture oblique, quadrate; inner lip straight, broadly reflexed in the middle; outer lip angular at the suture, smooth within; sutures canaliculate; base ornamented with granulose liræ alternately large and small;

umbilicus wide, perspective, the margin crenulated; color whitish, radiately painted with patches of reddish-brown. (A. Ad.)

Off Mino-Sima, Straits of Korea. 63 fms.

E. speciosa A. AD. Ann. and Mag. N. H. 1860, p. 409.

This species is more depressed and more widely umbilicated than *Enida japonica*, and the whorls are rather concave at the upper part; the granular liræ are wider apart, and the oblique striae of the interstices coarser. (A. Ad.)

G. GEMMULOSA A. Adams. Unfigured.

Shell depressed-conical, broadly umbilicated, sutures profoundly canaliculate; whorls rounded, ornamented with close transverse series of squamiform granules, 5 on the last whorl; whorls above at the sutures delicately plicate; aperture rounded-quadrangular; inner lip excavated and deeply reflexed in the middle; outer lip thickened and sulcate within, its margin crenate; base somewhat convex, bearing 4 series of squamiform granules; umbilicus profound, margin crenate. (A. Ad.)

Off Mino-Sima, Japan. 63 fms.

Enida gemmulosa A. AD. Ann. and Mag. N. H. 1860, p. 409.

This granular species differs very much from the two last described, but partakes of all the characters of the genus. the scale-like granules arranged in transverse rows are very peculiar. The aperture is nearly circular, and beautifully nacreous and pearly within; otherwise this shell might by some be mistaken for a species of *Echinella*. (A. Ad.)

Genus MONILEA Swainson, 1840.

Monilea SWAINSON, Shells and shell-fish, p. 352.—H. & A. ADAMS, Genera, i, p. 430.—FISCHER, Manuel de Conchyl., p. 824.—*Tulopia* GRAY, 1842.

Shells of the genus or subgenus *Monilea* have a more or less developed callous ridge or funicle revolving on the inner side of the whorl within the umbilicus, and terminating at the columella, the edge of which is reflexed over it. The outer surface is spirally striate or lirate, and closely obliquely striated. The Indian Ocean is the habitat of most of the forms, but some are found in the Pacific. The outer lip is usually lirate within, and the columella more or less obviously crenulate on its edge. The shell is heavy and strong; but

some species are as thin and light as in the closely allied group *Minolia*.

The following sections may be admitted :

A. Umbilicus with a spiral cord or funicle ; Section *Monilea*.

B. Umbilicus narrow without spiral funicle.

a. Shell globose-conic ; columella toothed below ; Section *Solanderia*.

b. Shell elevated-conic ; columella crenulate, not toothed ; Section *Priotrochus*.

Section MONILEA s. s.

M. CALLIFERA Lamarek. Pl. 41, figs. 1, 2, 3, 4, 5.

Shell narrowly umbilicate, conoidal, more or less depressed, strong, solid, lusterless, whitish or yellowish, with radiating maculations or stripes above, the base unicolorous or obliquely striped, stripes often interrupted ; spire conoidal, apex acute, corneous, sutures impressed, whorls about 6, convex, the last rounded at periphery but often with a tendency to be biangulate there ; densely finely lirate all over, the liræ very closely and finely beaded by the oblique incremental striae which are prominent in the interliral spaces ; aperture oblique, rounded-quadrate, conspicuously lirate within, the liræ extending nearly to the edge of the outer lip, and 10 in number ; columella short, ending below in a denticle, concave above and reflected partly over the umbilicus, and over the termination of a strong spiral funicle which almost fills the white umbilicus.

Alt. 12-14, diam. 18-19 mill.

Australia ; Philippines ; New Caledonia ; Andaman Is. ; Ceylon.

T. calliferus LAM., An. s. Vert., vii, p. 27.—DELESSERT, Rec. de Conch., t. 36, f. 5.—PHILIPPI, Conchyl. Cab., p. 206, t. 30, f. 13.—CHENU, Man. de Conchyl., p. 362, f. 2685.—FISCHER, Coq. Viv., p. 257, t. 86, f. 3.—*T. callosus* WOOD, Index Test., suppl., t. 5, f. 33 (not *T. callosus* Gmel.).—*T. masoni* G. & H. NEVILL, Journ. Asiat. Soc. Bengal 1874, p. 28, t. 1, f. 1.

T. masoni Nevill is figured on pl. 41, figs. 14, 15, 16, 17.

Has a stronger spiral funicle within the umbilicus than any other species. There is a considerable degree of variation in the development of this spiral pillar of callous in different individuals. The *T. calyculus* of WOOD (*Ind. Testaceo.*, suppl., pl. 6, fig. 44) may

be synonymous, but it has the columella shaped very differently at the lower part. (Pl. 61, fig. 13.)

M. LENTIGINOSA A. Adams. Pl. 41, figs. 8, 9, 10; pl. 60, figs. 23, 24.

Shell umbilicate, conical, very solid, whitish, unicolorous or obscurely striped or maculate with brown or buff; lusterless; spire conical; apex acute; sutures impressed; whorls 6 to 7, convex, the last with a tendency to be flattened around the middle; the entire surface covered with sharp close uneven spiral riblets with deeply incised interstices, and very fine, close, longitudinal growth-lamellæ, forming compressed beads on the liræ, and generally lamellæ in the interstices. Aperture oblique, rounded-quadrangular, with 10 or 11 plies within, which attain the edge of the lip. Columella short, toothed below, concave and somewhat expanded above. Umbilicus with a smooth funicle, not very prominent, within.

Alt. 17, diam. 22 mill.; alt. 21, diam. 20 mill.

Philippines; Singapore; Australia at Swan River, Sharks Bay, Outer Manly Beach and Cabbage-tree Bay.

M. lentiginosa A. AD. P. Z. S. 1851, p. 188.—*M. corrugata* A. AD., P. Z. S. 1854, p. 41 (not *T. corrugatus* Koch).—*Tr. lentiginosus* FISCHER, Coq. Viv., p. 317, t. 100, f. 1.

Umbilical funicle not nearly so strongly developed as in *M. calliferus*. This species has a great similarity to the shell described as *Trochus corrugatus* by Philippi; but as Dr. Fischer has pointed out, that is a different species on account of the smooth inside of the aperture.

M. PATRICIUS Philippi. Pl. 41, figs. 30, 31.

Shell deeply umbilicated, thick, orbicular-conoid, shining, whitish-ashen, punctate with brown or blackish-violet; spire acute; whorls 7, scarcely convex, separated by a canaliculate suture; spirally cingulate, the cinguli narrow, remote, granose, 4 to 5 on the penultimate whorl; last whorl subbiangulate in the middle, encircled by unequal liræ; base slightly convex, radiately striate and with about 8 white and violet articulated concentric liræ; aperture subrhomboidal, sulcate within; columella arcuate, its base truncate-dentate, and above partly covering the umbilicus. Umbilical area white.

Alt. 15, diam. 18 mill. (*Fischer*.)

Central American Coasts (?)

T. patricius PHIL. Zeitschr. f. Mal. 1851, and Conchyl. Cab., p. 326, t. 46, f. 11.—FISCHER, Coq. Viv., p. 277, t. 91, f. 2.—*Monilea kalisoma* A. AD. P. Z. S. 1851, p. 188.

The locality given above is very doubtful.

M. STRIATULA Garrett. Pl. 61, figs. 19, 20.

Shell narrowly umbilicate, rather thin, shining, apparently smooth, but under a lens seen to be covered with a fine decussated pattern of close oblique striæ cut by coarser engraved spiral lines; color whitish-rosy, white or buff, mottled with brown, rose or fawn-color, and spirally encircled by several very narrow lines of articulated white and brown; spiral conical, apex acute, sutures well impressed; whorls 5 to 6, convex, the last obtusely subangular at the periphery, convex beneath; aperture subcircular, oblique, within very delicately sulcate or nearly smooth, lined with a thin, silky, iridescent milky-bluish naere; outer lip acute, thin; columella regularly arcuate, not toothed below, produced in a thin olive-colored lobe partly over the umbilicus; umbilicus narrow, deeply spirally grooved within.

Alt. 6, diam. 8 mill; alt. 11, diam. 14 mill.

Viti Is.; Hawaii.

Trochus striatula GARRETT, Proc. Cal. Acad. i, p. 102. (1857.)

A small shining, smooth species, with rounded whorls and beautiful microscopic surface decussation. The specimens from which the above description was drawn are from the Viti Is., collected by GARRETT.

M. VITILIGINEUS Menke. Pl. 41, fig. 28.

Shell umbilicate, conoidal, rather thin; whorls 6, convex, the first smooth, whitish, the remainder corneous-fulvous, maculate above with white or brown, ornamented with narrow remote articulated zones, flattened-sloping above, angulate, very delicately obliquely striate, spirally very finely lirulate; last whorl angular, convex beneath; base ornamented with several concentric brown and white articulated lines, radiately and spirally striated; aperture subquadrate, margins thin; columella oblique, reflexed outward into a linguiform lobe; umbilicus with a spiral funicle terminating in the columellar lobe. Alt. 8, diam. 11 mill. (*Fischer.*)

Port Jackson and St. Vincents Gulf, Australia; N. Australia; Philippines; Japan.

T. vitiligineus MKE. Moll. Nov. Holl., p. 18.—PHILIPPI, Conchyl. Cab., p. 176, t. 28, f. 2.—FISCHER, Coq. Viv., p. 397, t. 118, f. 3.—*Minolia vitiliginea* ANGAS, P. Z. S. 1865, p. 182; *l. c.* 1867, p. 217.—*T. vitiligineus* LISCHKE, Jap. Meeres Conchyl. ii, p. 86.—*Margarita nitiligineus* A. AD., P. Z. S. 1851, p. 190.—*Trochus (Solariella) vitiligineus* WATSON, Challenger Gasteropoda, p. 72.

I have seen no specimens which I can refer with certainty to this species. I think it possible that Fischer has wrongly identified it. This species and the last should be critically compared and investigated by some naturalist who has abundant material. The entire genus *Monilea* is very much in need of a more thorough revision than the limited material before me allows me to attempt.

T. vitiligineus may belong in *Minolia*.

M. WARNEFORDI G. & H. Nevill. Pl. 41, figs. 12, 13.

Shell flatly conoidal; whorls 6, angular, spirally ribbed with rather distant, slightly undulating costulations, keeled at the periphery; on the angle of the last whorl a row of slightly raised transverse undulations, giving the shell a coronated appearance; brown irregularly and minutely reticulated with white; base smooth, glabrous, closely ribbed, ribs somewhat superficial, flat, with a smooth thickened callosity round the umbilicus, forming a tooth on the margin of the columella; interior of the aperture barely striated. The only species at all resembling this fine shell are *Monilea rigata* Phil., *M. callifera* Lam. (also found in our Indian seas), and our *M. masoni*; it can, however, be easily distinguished from all of them by the above characters. Alt. $9\frac{1}{2}$, diam. $13\frac{1}{2}$ mill. (Nevill.)

Andaman Is.

Trochus (Monilea) warnefordi NEVILL, Journ. Asiat. Soc. Bengal 1874, p. 27, t. 1, f. 2.

C. BELCHERI Philippi. Pl. 61, figs. 3, 4.

Shell depressed-conoidal, umbilicate, thin, sharply transversely lirate, white, painted with scattered red dots and a few larger red spots; whorls convex, separated by a subcanaliculate suture, the last rounded; umbilicus surrounded by a peculiarly reddish colored callous; aperture subrhomboidal; columella nearly perpendicular, incised at base. (Phil.)

A very handsome species. The shell is rather thin, somewhat depressed; the whorls are strongly convex, especially at the sutures, which are therefore almost channelled; the last is well rounded.

The upper surface is ornamented with narrow, elevated, sharp liræ, of which three are stronger, alternating with two or three smaller ones; about 12 similar ones are on the base; all of them are crossed and made subgranose by closely crowded growth-lines. The umbilicus is moderate, surrounded by a peculiar callus, which shows only growth-lines. The aperture is almost rhombic; the columella oblique below in the middle of the callous excavated. On a white ground there are strewn red dots and larger spots. The apex is white or rose-red. The umbilical callous is reddish-brown. Alt. $9\frac{1}{2}$, diam. $12\frac{3}{8}$ mill. Allied to *T. crenulatus* Mke., but differing in the coloration, deep sutures and umbilical callous. (*Philippi*.)

Inside the reef at Tongatabu, off Nukalofa, 18 fms. (Watson.)

T. belcheri PHIL., Zeitschr. f. Mal. 1849, p. 148; Conchyl. Cab., p. 302, t. 44, f. 3.—WATSON, Challenger Rept., p. 71.

M. RIGATA Philippi. Pl. 41, figs. 32, 33.

Shell conoidal, umbilicate, transversely closely sulcate, longitudinally closely striate; whitish; clouded with brown; whorls rather convex, the last rounded; base plano-convex, *closely sulcate*; *umbilicus funnel-shaped*, dilated, modified by two spiral callouses; columella arcuate, base truncate. (*Phil.*)

The shell is somewhat flatly-conoidal, with 7 moderately convex whorls. The penult. has about 8 elevated lines, often in pairs; the last whorl has 12. They are decussated by dense oblique elevated growth-lines, as are also the slightly wider interstices. The base is level, and has about 8 narrow slightly elevated concentric liræ. The umbilicus is pretty narrow, but at the last whorl is widely funnel-shaped, showing two rounded spiral ribs, the lower terminating in the denticle at base of the columella. The aperture is rounded rhombic; the throat sulcate within; the columella produced outward with a somewhat reflexed margin. The color above is whitish or pale rust-yellow, with brown spots; beneath it is lighter with wavy interrupted brown lines, and darker umbilical border. Alt. 10, diam. 15 mill. This species stands midway between *T. solandri* and *T. calliferus*. It is separated from the first by the broader umbilicus, the slightly elevated spiral liræ, which on the base are narrow and crowded; from the last the much less developed umbilical callus separates it. (*Philippi*.)

Adelaide, Australia.

T. rigatus PHIL. Zeitschr. f. Mal. 1848, p. 124; Conchyl. Cab., p. 184, t. 28, f. 14.

M. SOLANDRI Philippi. Pl. 61, figs. 9, 10.

Shell depressed-conoidal, whitish, sprinkled with brown spots and streaks; whorls convex, encircled with close obsoletely crenulated, subgranose liræ; base with 8 cinguli, the interstices elegantly punctate-foveolate; umbilicus open, spiral; columella arcuate, base produced into a denticle; lip sulcate within. (*Phil.*)

The shell is pretty flatly conoidal, pretty thin, and consists of 7 whorls; they are pretty convex, and are encircled by about 10 double, strongly elevated sharp liræ, each consisting of a larger and a smaller; on the last whorl there are still more. These liræ on my specimens are scarcely granulate to speak of, but the interstices are crowded with growth-lines. The base, which distinguishes this species from *T. rigatus* and *T. calliferus*, is pretty flat, with 8 smooth concentric liræ, of which the broad interstices are very prettily punctate, or rather divided into little pits. The umbilicus is moderately wide, and opens out like a funnel, and is sharply bounded by the innermost rib of the base. The aperture is lower than broad, rather quadrangular; the outer lip and throat are sulcate; the columella is produced, and ends in an acute tooth. The color is white, with brown dots, which often, especially on the base, coalesce into streaks. Alt. 11, diam. 15 mill. (*Philippi.*)

West Coast of Australia.

Monodonta crenulata MKE., Moll. Nov. Holl., p. 14 (1843) (not *T. crenulatus* Lam. nor Brocchi).—*T. solandri* PHILIPPI Conchyl. Cab., p. 180, t. 28, f. 8.—*Monilea plumbea* A. AD. P. Z. S. 1851, p. 188.

M. LIFUANA Fischer. Pl. 41, figs. 6, 7; pl. 59, figs. 64, 65.

Shell perforate, conoid-depressed, rather thin; color very variable, whitish-buff or rosy, brown reddish, ornamented with rosy maculations and narrow spiral lines articulated with white; transversely delicately sulcate, the sulci exquisitely decussated by incremental striæ; whorls 6, slightly convex, the first buff, the remainder subangulate; last whorl dilated, slightly subangular in the middle, convex beneath and very finely decussated; aperture subovate, delicately sulcate within; columella arcuate; columellar callous thick, semicircular, yellowish or livid-green, almost covering the umbilicus.

Alt. 11, diam. 14 mill. (*Fischer.*)

Id. of Lifou, Loyalty Archipelago.

T. lifuanus FISCHER, Journ. de Conchyl. 1878, p. 63, 206; Coq. Viv., p. 388, t. 116, f. 4.—Smith, Zool. 'Alert.'

Easily to be distinguished from *T. calliferus* by the thin shell, fine sculpture, and colored columellar callous. The example figured is about double the size of the other specimens seen, according to Dr. Fischer.

M. EGENA Gould. Vol. IX, Pl. 6, figs, 22, 23; vol. XI, 'pl. 37, f. 13.

Shell minute, low ovate-conic, thin, amply umbilicated, ashy white, pearly beneath; whorls 6, convex, the last obtusely angular, each one encircled by 4 sharply-compressed well-elevated ribs the two uppermost of which are beaded; interspaces concave, smooth, with a single groove near the margin of the umbilicus; the latter occupies $\frac{1}{3}$ of the base, is tunnel-shaped, penetrating to the apex, its sides excavated on each whorl, the verge of which is crenulated; aperture nearly circular, slightly encroached upon by the inflection of the columella; lip simple; interior pearly.

Alt. $\frac{1}{4}$, diam. 3-10 inch. (*Gould.*)

New Zealand.

Solarium egenum GOULD, Proc. Bost. Soc. N. H. iii, p. 84 (1868); U. S. Expl. Exped. Shells, p. 196, atlas, fig. 226.—*Monilea zelandica* HUTTON, Cat. Mar. Moll. N. Z. (1873).—*Margarita zelandica* Hutton, SOWB. in Conch. Icon., Monog. Margarita, f. 17.—*Monilea egena* HUTTON, Proc. Linn. Soc. N. S. Wales, 1884, p. 365.—*Torinia egena* MARSHALL in TRYON, Manual of Conchology; ix, p. 22, t. 6, f. 22, 23.

I have not seen this shell. I follow Prof. Hutton in referring it to *Monilea*. Pl. 37, fig. 13 is the *Margarita zelandica* of Sowerby.

Unfigured species of Monilea.

M. TURBINATA Tenison-Woods.

Shell turbinately conical, perspectivevly umbilicate to the apex, fleshy whitish, clouded with pale brown spots and streaks; whorls 6, rounded, obtusely angulate and subcanaliculate above, spirally sulcate, and girdled with numerous (about 12) liræ alternating great and small; suture impressed; apex obtuse and pearly; last whorl angulate at the periphery; base convex, lirate and transversely slenderly spirally striate; aperture transversely ovate; lip thickened and nacreous, lirate within; columella short, sloping, concave; umbilical margin 3-costate, terminating with 4 tubercles. Closely

allied to *M. corrugata* of N. S. Wales, but more conical, the whorls not granular, umbilicus wider, and terminating in four tubercles.

Long. 18, lat. 20 mill. (*Ten.-Woods.*)

North Coast of Tasmania.

M. turbinata T.-WOODS, Proc. Roy. Soc. Tasm. 1876, p. 145.

M. APICINA Gould. Testa parva, ovata conica, tenuis, filis numerosis subequalibus cincta; apice et flammulis sparsis radiantibus rosaceis; anfr. 5, convexiusculis, ad peripheriam obtusis; sutura profunda; basi convexo, lineis incrementi nonnihil granulatis; umbilico minuto, costa callosa marginali et altera interiori cincto; apertura fere circularis.

Axis 5, diam. 6 mill. (*Gould*, Proc. Bost. Soc. N. H. viii, p. 16, 1861.)

Port Jackson.

M. VERNICOSA Gould. T. parva, tenuis, depressa, orbicularis, nitida, minutissime reticulata, virescens strigis saturioribus ad suturam et ad peripheriam quadratim dilatatis et superne cingulis 4 albo articulatis picta; anfr. 5, convexis ad peripheriam subacutis; sutura profunda; basi convexo; umbilico profundo, pallido, extus excavato et plicato; apertura ampla; columella expansa, antice angulata, extus dentata.

Axis 4, diam. 6 mill. (*Gould*, l. c. p. 16).

Ousima.

M. NANA Gould. T. minuta, solida, ovato-globosa, albida; anfr. 4, ad suturam plicatis, ultimis liris granulosis 2-3 cinctis; apice obtuso, levigato; basi convexo, concinne striato; umbilico satis magno, plicato-crenulato; apertura circularis; labro crasso; columella tenui, antice dilatata.

Diam. 2+ mill. (*Gould*, l. c. p. 16.)

China Coral Seas.

M. INEPTA Gould. T. minuta, solida, ovato-conica, filis (quorum cingulo eminentiore) articulatis rosaceis vel argillaceis cincta, intervallis pallidioribus, regione suturali tessellato; anfr. 4+, convexis; apice obtuso; basi convexo; umbilico plicato, albido cincto; apertura circularis, labro simplici, crasso; columella aequabili. Diam. 3 mill. (*Gould*, l. c. p. 16.)

Kagosima Bay.

M. GLAREOSA Gould. T. parva, solida, ovato-globosa, cinerea, flammulis radiantibus fuscis variegata; anfr. 5, ventricosus, apicalibus plicato-granulosus, ceteris liris frequentibus, quorum 3-4 majoribus interdum subdivisis cinetis; basi rotundato; umbilico modico, ad marginem plicato-crenato; apertura circularis; labro incrassato, simplici. Diam. 5 mill. (*Gould, l. c. p. 17.*)

Loo Choo, Ousima and Kikaia.

M. SPURIA Gould. T. parva, rudis, crassa, depressa, orbicularis, albida; anfr. 4, supernis simplicibus, alteris liris 4 elevatis et lineis incrementi decussatis, ultimo ad peripheriam obtuso; basi convexo; umbilica amplo, profundo, scalariformi; apertura circularis; columella tenui; labro antice dilatato.

Diam. 5, axis 4 mill. (*Gould, l. c. p. 17.*)

Simon's Bay.

M. LIRATA A. Adams. Testa orbiculato-conica, umbilicata, pallida; anfr. paulum convexis, liris transversis elevatis distantibus, interstitiis decussate striatis ornatis; anfr. ult. angulato, basi convexa, margine umbilici sulco cineto. (*A. Ad., P. Z. S. 1851, p. 188.*)

Habitat unknown.

M. PUSILLA A. Adams. T. orbiculato-conica, umbilicata, rubescens, fusco variegata; anfr. planiusculis, cingulis granorum transversum distantibus (circa quatuor) ornata, interstitiis transversim striatis; columella in medio sinuata. (*A. Ad. l. c., p. 188.*)

Habitat unknown.

M. SWAINSONII A. Adams. T. conoidea, umbilicata, albida, nigro variegata; anfr. planis, cingulis subgranosis, albo nigroque articulatis ornatis; ultimo subangulato, basi planiuscula, cingulis rufo-articulatis ornata; columella basi tuberculata; labro intus lirato.

(*A. Ad. l. c. p. 189.*)

Habitat unknown

M. MENKEI A. Adams. T. orbiculato-conoidea, umbilicata, sordide alba; anfr. convexusculis, supremis transversim liris, interstitiis longitudinaliter rugoso-reticulatis; infimis cingulis granulosus, confertis, granulis nonnullis majoribus ornatis; umbilici margine callo carneo, spirali, striato cineto; columella in medio sinuata callo reflexo instructa, antice bituberculata; labro intus lævi. (*A. Ad. P. Z. S. 1854, p. 38.*)

Masbate, Philippines. (Cuming.)

M. PHILIPPII A. Adams. T. orbiculato-conoidea, umbilicata, sordide cornea, fusca radiatim picta; anfr. convexusculis, cingulis transversis, aequalibus, crenulatis, interstitiis longitudinaliter striatis ornatis; margine umbilici callo spirali, fusco, radiatim striata cineto; columella in medio sinuata, ecallosa, antice obsolete bituberculata.

(*A. Ad.* l. c. p. 39.)

China Seas.

The species most nearly resembling this is the *T. belcheri* of Philippi, which I imagine is the *T. calyculus* of Wood. (*Ad.*)

M. PHILIPPIANA Dunker.

Shell small, rather solid, conoidal, umbilicate; whorls $5\frac{1}{2}$, plano-convex, the last and the penultimate subangulate, encircled by spiral crenelliferous costulae, finely striated in the interstices only visible under a glass; last whorl rather biangulate, with three larger median ribs; base convex, ornamented with about 10 small crenated equal ribs; umbilicus pervious, with a crenated margin, provided with a spiral rib inside; aperture subrotund; color pale gray, umbilical margin white, the riblets, especially the larger punctate and articulated with black.

Alt. 4, diam. 6 mill. (*Dkr.*)

Samoan Archipelago.

Monilea Philippiana DKR., Malakozool. Bl. xviii, p. 170, 1871.

An unfigured species, allied in sculpture and coloration to *Tr. preissianus*.

M. TENUILIRATUS Dunker.

Shell orbiculate-convex, depressed conoidal, perforate, very thin, pellucid, shining, whitish, variegated and spotted with pale ashen and reddish; whorls 7, convex, moderately increasing, the last subangulate; base convex, perforated by a narrow umbilicus, with a white spiral rib terminating in a small concave lamina; aperture subrotund, lip acute; columella a little thickened.

Alt. 6, diam. 10 mill. (*Dkr.*)

Samoa Islands.

Trochus tenuiliratus DKR., Mal. Bl. xviii, p. 168, 1871. Allied to *T. vitiligineus* Mke.

Section *SOLANDERIA* Fischer, 1880.

Solanderia FISCHER, Coq. Viv., Monogr. Trochus, p. 417 (1880); Man. de Conchyl., p. 824.

M. NUCLEA Philippi. Pl. 61, figs. 31, 32.

Shell narrowly umbilicate, globose-conoidal, solid, whitish, maculated with chestnut, sometimes banded, often punctate and articulated with white dots; spire conic, acute, short; sutures impressed; whorls 5 to 6, convex, decussated by spiral liræ and close, strong longitudinal striae; the liræ usually with intermediate lirulæ; whorls often a little flattened below the suture, with a slight angle at the shoulder; last whorl globose and convex; aperture slightly oblique; outer and basal lips closely lirate within; columella short, concave, its edge plicate-denticulate, terminating below in a tooth; umbilicus funnel-shaped, white, margined by a slight convexity terminating below the columellar tooth.

Alt. $7\frac{1}{2}$ diam. $8\frac{1}{2}$ mill.; alt. 9, diam. 9 mill.

New Caledonian Archipelago; Japan; Viti Is. (Garrett.)

T. nucleus PHIL. Zeitschr. f. Mal. 1849, p. 171; Conchyl. Cab., p. 306, t. 44, f. 9.—FISCHER, Coq. Viv., p. 256, t. 86, f. 2.

A peculiar little species, of globose form, with truncated columella, lirate interior, and finely decussated surface. The color pattern is very variable. The Viti Id. specimens before me have rather large, angular radiating maculations above, of a blackish umber shade, a lighter girdle around the periphery, the base maculated and tessellated umber and buff.

Subgenus PRIOTROCHUS Fischer, 1880.

Aphanotrochus v. MART., in Möbius' Reise nach Mauritius, Mollusken, p. 296 (1880) type, *Tr. obscurus* Wood.—*Priotrochus* FISCHER, Coq. Viv., p. 420 (1880); Manuel de Conchyl., p. 824.

Von Martens declares Fischer's name, *Priotrochus* to have one month priority.

The relations of the group are with *Monileu* and *Solanderia*. The operculum and animal are unknown.

M. OBSCURUS Wood. Pl. 61, figs. 33.

Shell narrowly perforated, conical, elevated, very solid, thick, ashen-white, with longitudinal chestnut streaks or maculations, spire elevated, apex acute, sutures slightly impressed, the whorl below them closely appressed; whorls 6 to 7, the upper ones sub-angular and nodulose in the middle, the last with a coronal series of knobs, on large specimens becoming obsolete toward the aperture; entire surface traversed by spiral lirulæ, much narrower than

the densely obliquely striate interstices; aperture oblique, about half the length of shell, ovate; outer lip bevelled to an edge; throat spirally lirate; edge of columella denticulate, its upper insertion callous, partly or nearly covering the umbilicus.

Alt. 23, diam. 18 mill.

Red Sea to Natal.

T. obscurus WOOD, Index Testaceologicus, suppl. t. 5, f. 26.—PHILIPPI, Abbild. ii, Trochus t. 6, f. 3; Conchyl. Cab., p. 200, t. 30, f. 3.—FISCHER, Coq. Viv., p. 208, t. 69, f. 2.—KRAUSS, Die Südafric. Moll., p. 98.—MARTENS, Möbius' Reise n. Mauritius, p. 296.—*T. signatus* JONAS, Zeitschr. f. Mal. 1848, p. 171.—*T. lineolata* BIANCONI, Mem. della Accad. Sci. della Instituto di Bologna, ser. 2, iv, p. 524, t. 1 (1864).

Young specimens are subbiangulate with nodulose periphery.

M. CHRYSOLÆMA von Martens. Pl. 39, fig. 27.

Shell conoid-ovate, perforate, sculptured with about 8 spiral liræ above the suture, 11 below; grayish-white; whorls 5, convex, separated by rather deep sutures; last whorl rounded, base convex; aperture ovate-circular, moderately oblique, small; outer margin slightly thickened within, simple; columellar margin callously thickened, obtusely denticulate; throat golden, spirally striate.

Alt. $7\frac{1}{2}$, diam. $6\frac{1}{2}$ mill.; aperture alt. 4, width $3\frac{1}{2}$ mill. (*Von Martens.*)

Black River, Mauritius.

Tr. (Aphanotrochus) chrysolæmus MART., Reise nach Mauritius, p. 296.

M. GOUDOTI Fischer. Pl. 61, fig. 36.

Shell small, imperforate, thick, conoid-elongated; whorls 6 to 7, convex, whitish-ashen, punctate with rose-color, maculate with spadiceous; spirally cingulate, the penultimate whorls with 8 cinguli; last whorl elongated, rounded in the middle, appressed below the suture, convex beneath; aperture ovate-subquadrate; lip crenulated; columella arcuate, delicately crenulated.

Alt. 9, diam. 6 mill. (*Fischer.*)

Id. of St. Marie, near Madagascar.

T. goudoti FISCHER, Journ. de Conchyl. 1878, p. 62; Coq. Viv., p. 371, t. 113, f. 3.

Subgenus MINOLIA A. Adams, 1860.

Minolia A. AD. Ann. & Mag. Nat. Hist. iv, 1860, p. 336.—FISCHER Manuel de Conchyl., p. 824.—*Solariella* H. & A. ADAMS, Genera Rec. Moll., i, p. 431.—WATSON, Challenger Gasteropoda, p. 72 (not *Solariella* Searles Wood).—*Minosia* AD. DUNKER, Ind. Moll. Mar. Jap., p. 142.

Minolia includes a number of broadly umbilicated thin-shelled depressed trochids, with cylindrical or angulated whorls, and fine decussated sculpture. They are like *Monilea* in many respects, differing in the simple umbilicus, which has no spiral callous funicle within it. The species belong to the Indian Ocean, western and southwestern Pacific. As is the case in many groups of Trochidae, I have been obliged to select the species belonging here out of a number of very dissimilar genera or subgenera; and I doubt not that still more forms, referred heretofore to *Gibbula*, *Margarita*, or simply *Trochus*, will be found to group in *Minolia*. The dentition and animal are unknown. The use by some authors of the name *Solariella* for this group is obviously indefensible. At the same time, it must be admitted that no character in the shells really separates *Minolia* and *Solariella*. It remains to be seen whether the dentition will confirm their separation. In the arrangement of the genera of Trochidae it must be admitted that we are all at sea. The systems proposed by various authors break down at so many points that their artificial nature becomes obvious. Nevertheless, there undoubtedly is a natural classification to be ascertained; this awaits a fuller knowledge of the anatomy of the group. The type of the group is *M. punctata* AD.

M. PUNCTATA A. Adams. Pl. 44, fig. 33.

Shell helicoid, widely umbilicated, fulvous, punctate with red; whorls $6\frac{1}{2}$, convex, traversed by spiral granulose cinguli ornamented with red dots, and alternately larger and smaller, the interstices beautifully clathrate with delicate oblique lamellae; suture canaliculate; umbilicus perspective, with concentric granulose cinguli, the interstices closely clathrate. (A. AD.)

Id. of Mino-Sima, near Nippon, Japan.

Minolia punctata AD. Ann. Mag. N. H. 1860, p. 337. *Margarita punctata* AD., SOWB. Conch. Icon., f. 14.

This is another modification of the hollow spiral cone of the Trochoid family; the whorls are somewhat loosely rolled on themselves,

which causes the sutures to be very deep, and the last whorl at the peristome to be almost disunited from the penultimate whorl. The red-brown spots on the beaded ribs and the exquisite clathrate sculpture of the surface render this one of the prettiest shells in the great family of Trochoid scutibranchs. In texture it resembles *Enida japonica* and *Tereica monilifera*, and judging from the shell, it appears to be more closely associated with the *Ziziphinus* group than with the *Gibbula* or *Margarita*. (A. Ad.)

M. CARINATA A. Adams. Pl. 44, fig. 28.

Shell elevated conical, perforate, brown, ornamented with transverse liræ, the upper two decussated by longitudinal riblets, the lower ones plane, the interstices delicately longitudinally striated; base somewhat flattened, sculptured with concentric riblets with radiating striæ in their interstices; margin of the umbilicus crenulated. (Ad.)

Catbalonga, Philippines, 8 fms.

Margarita carinata AD., P. Z. S. 1851, p. 190.—Sowb., in Conch. Icon., f. 22.

M. PULCHERRIMA Angas. Pl. 41, fig. 37.

Shell depressedly conical, rather solid, transversely finely ridged, with two or three broader ridges forming keels, the interstices crossed everywhere with very fine close-set oblique striæ; pinkish or yellowish white stained on the body-whorl with bright rose, and spotted on the keels with deep purple lake; whorls 6, angularly convex; sutures broadly and flatly channelled; last whorl tricarinate, beneath white and rounded; umbilicus wide, perspective, crenate within; aperture circular, pearly inside; peristome continuous, margins thin, simple. Alt. 5, diam. 8 mill. (Angas.)

Brisbane Water, New South Wales.

Minolia pulcherrima ANGAS, P. Z. S. 1869, p. 48, t. 2, f. 10.

The umbilicus is two mill. wide; the aperture is perfectly circular, 3 mill. across; apex buff. My specimen is less strongly 3-keeled than the original description and figure indicate.

M. BELLULA Angas. Pl. 41, figs. 27.

Shell umbilicated, conoidal, rather thin, shining; whorls 6, convex, depressed-canaliculate above, and terraced; the first whitish, the remainder whitish, beautifully ornamented with regular, equidistant, radiating, somewhat flexuous radiating rosy streaks;

spirally delicately striate; last whorl carinated; base white, radiately striate, somewhat convex; aperture subquadrate, smooth inside; lip thin, columella scarcely arcuate, narrow, forming an angle with the basal margin; umbilical area funnel-shaped, white, carinated, the carina subnodulose.

Alt. 6; diam. $8\frac{1}{2}$ mill. (*Fischer.*)

Brisbane Waters, N. S. Wales.

Minolia bellula ANGAS, P. Z. S. 1869, p. 48, t. 2, f. 11.—*T. dianthus* FISCHER, Coq. Viv., p. 396, t. 118, f. 2.

Those naturalists who retain intact the Linnæan genus *Trochus* must adopt Fischer's name *dianthus* for this form, as *bellulus* is pre-occupied by Philippi in *Cantharidus*.

M. PUDIBUNDA Fischer. Pl. 41, fig. 26.

Shell small, umbilicated, conoid, rosy-red, ornamented with minute white dots; whorls 6, slightly convex; the first smooth, white, the remainder spirally delicately cingulate, cinguli 6 to 8 on the penultimate whorl; last whorl angulate; base convex, radiate with rose-color, buff around the umbilicus, concentrically lirate, the liræ about 17-18; aperture ovate-subtetragonal; lip simple; columella arcuate, a little reflexed; umbilicus longitudinally striate, with a spiral marginal funicle. Alt. 6, diam. 7 mill. (*Fischer.*)

New Caledonian Archipelago.

T. pudibundus FISCHER, Journ. de Conchyl. 1878, p. 66, 206; Coq. Viv., p. 376, t. 114, f. 3.

M. PREISSIANA Philippi. Pl. 41, fig. 29.

Shell deeply umbilicated, orbicular-depressed, rather thick; whorls 5 to $5\frac{1}{2}$, separated by profound sutures, whitish, conspicuously ornamented with flexuous rosy-brownish lines and remote spots at the suture and periphery; first whorls smooth; the following spirally, delicately sulcate, with an elevated ridge in the middle; last whorl bicingulate, the cinguli elevated, distant; base convex, concentrically lirate, the liræ larger around the umbilicus; umbilical area sulcate and funiculate within; aperture subrotund; columella arcuate, not dentate.

Alt. 6, diam. 7 mill. (*Fischer.*)

Gulf of St. Vincent, King Georges Sound, etc., Australia.

T. preissianus PHIL., Zeitschr. f. Mal. 1848, p. 123; Conchyl. Cab., p. 177, t. 28, f. 3.—FISCHER, Coq. Viv., p. 245, t. 83, f. 3.—*Gibbula porcellana* A. AD., P. Z. S. 1851, p. 186.

Compare *Gibbula weldii* Tenison-Woods.

M. UNICARINATA Fischer. *Unfigured.*

Shell small, umbilicate, orbicular-conoid; apex acute, whorls 6, planulate, separated by linear sutures; the first whitish, remainder white and ashen clouded, spirally granose lirate, liræ narrow, 5 on the penult. whorl, the interstices wider, and often with an intermediate lirula; last whorl acutely carinated, maculate at the periphery with white and chestnut, convex beneath, white and ashen tessellated, concentrically lirate, liræ about 12, the central ones closer and wider; aperture subquadrate, margins thickened, plicate; columella oblique; umbilical area white concave, spirally plicate-funiculate, subcrenate outside. Alt. 4, diam. 7 mill. (*Fischer.*)

Australia (Quoy & Gaimard).

T. unicarinatus FISCHER, Journ. de Conchyl. 1879, p. 23.

Described from a single specimen in the Paris Museum. "Allied to *T. preissianus*, but differs in being smaller, with narrower aperture, acutely carinated periphery, flat whorls, etc."

M. RHODOMPHALA Soubervie. Pl. 41, figs. 22, 23, 24.

Shell umbilicated, depressed-orbicular; spire subelate, apex obtuse, carinate, radiately very delicately striate, spirally, regularly impressed-striate; white, spotted in various ways with rosy and yellowish, a broad rosy-tinted umbilical tract; whorls 6, convex, separated by impressed sutures, above radiately subplicatulate-striate; last whorl more or less obtusely carinated, the umbilical region broadly funnel-shaped, subplicate-striate; aperture pearly within, oblique, subrhombic-rounded, the margins joined by a thin callous, right margin acute, columellar margin much thickened, at the umbilicus narrowly reflexed; umbilicus moderate, very profound. Alt. 8, diam. 5 mill. (*Fischer.*)

Lifou, Loyalty Archipelago.

T. (Monilea) rhodomphalus SOUBERVIE, Journ. de Conchyl. 1875, p. 36, t. 4, f. 3.—FISCHER, *l. c.* 1878, p. 210; and Coq. Viv., p. 392, t. 117, f. 3.—*T. rotellæformis* PHILIPPI Conchyl. Cab., p. 302, f. 44, f. 2.

A small, depressed, shining, porcellaneous shell, remarkable for its bright rose-colored umbilical tract. (*Fischer.*)

There is not much doubt that this is the same as Philippi's *T. rotellæformis* (pl. 61, figs. 21, 22, 23). The latter name of course has priority.

M. PRODUCTA Fischer. Pl. 41, fig. 25.

Shell small, broadly umbilicated, thin, orbicularly depressed; whorls 6, the first whitish, shining, the following ornamented with dots of pale chestnut and tawny, separated by linear sutures, terraced above, planulate, carinate, spirally delicately striate; last whorl dilated, acutely bicarinated, convex beneath, shining, cingulate with articulated lines, with fine radiating and concentric striæ; aperture quadrate, margins acute; columella almost vertical, a trifle reflexed above; umbilical area buff, more prominently striate.

Alt. $\frac{1}{2}$, diam. 7 mill. (*Fischer*.)

Port Jackson; N. S. Wales, Australia.

Margarita angulata A. ADAMS, P. Z. S. 1851, p. 190.—*Minolia angulata* ANGAS, P. Z. S. 1867, p. 217.—*T. productus* FISCHER, Coq. Viv., p. 395, t. 118, f. 1.—WATSON, Challenger Gasteropoda, p. 72.

Angulata is several times preoccupied as a specific name in *Trochus* but not in *Minolia* nor *Monilea*; the original description by Adams being wholly insufficient for identification, I prefer to adopt Dr. Fischer's name.

M. TASMANICA Tenison-Woods. Pl. 61, figs. 38, 39, 40.

Shell broadly umbilicate, depressed, with low-conoidal spire, thin, scarcely shining, opaque whitish, upper surface with radiating maculations of purplish or olive-brown, base marbled with the same colors; apex acute minute; sutures well impressed; whorls about $5\frac{1}{2}$, convex, those of the spire subangular in the middle, flattened below the suture, giving the spire a terraced appearance, last whorl sub-cylindrical, obtusely subangular at the periphery, convex beneath; surface all over encircled by delicate spiral elevated striæ, and around the umbilicus decussated by growth lines; aperture sub-circular, a trifle modified by the contact of the penultimate whorl; margins all thin, simple; umbilicus about $\frac{1}{4}$ the diameter of base, opaque white within, and longitudinally striated.

Alt. $4\frac{1}{2}$, diam. 6 mill.

Bass' Straits and Long Bay, Tasmania.

Margarita (Minolia) tasmanica TEN.-WOODS, Proc. Roy. Soc. Tasm. 1876, p. 143 (1877).

Tenison-Woods gives alt. 5, diam. 9 mill. for the dimensions of this species. The tubular whorls, rounded save for a flattened area below the suture, and keel-less except for the carina banding that area, will discriminate this shell from many species; other marks are the

delicate spiral striation, wide umbilicus, and broad radiating maculations of the upper surface.

M. ROSEA Tenison-Woods. *Unfigured.*

Shell minute, turbinate, widely umbilicate, rose-color, variegated with white spots, whorls 4, rounded, encircled with white alternating large and small striæ; aperture entire, rounded; outer lip produced; inner lip simple; umbilical margin furnished with a somewhat inconspicuous white corrugated callous. Diam. 3 mill. This shell is of intense carmine color in some specimens. The outer lip is produced very much from the suture, so as to give the aperture a sunken appearance. The callosity at the umbilicus is only perceptible under the lens in very good specimens. (*Tenison-Woods.*)

Tasmania.

Monilea rosea TEN.-WOODS, Proc. Roy. Soc. Tasm. 1875, p. 154 (1876).

M. CHINENSIS Sowerby. Pl. 34, figs. 26.

Shell conical, moderately umbilicated, gray, all over ornamented with narrow undulating white streaks, more conspicuous beneath, shining; spire rather acute, moderately elevated, gradate; whorls 7, separated by an impressed suture, sculptured by oblique very delicate striæ, bicarinate above; last whorl obtusely angulated beneath, carinated at the angle; base convex, more or less spirally sulcate; umbilicus round, deep, lirate; aperture oblique, subquadrate. Operculum corneous, thin, multispiral, concave outside.

Alt. 10, diam. 11 mill. (*Sowerby.*)

Hong Kong, China.

Minolia chinensis SOWERBY, P. Z. S. 1888, p. 569, t. 28, f. 13.

In form like *Minolia biangulata* Angas, but much larger, obliquely striated, and without the beaded ridge bordering the umbilicus. The interior of the umbilicus is spirally grooved. (*Sowb.*)

M. DEGREGORII Caramagna. Pl. 51, figs. 18, 19, 20.

Shell subdiscoidal, delphinuliform, very fragile, umbilicate; spire conoidal, depressed, obtuse; whorls 5, spirally finely striate, in the middle slightly angled or subcarinate, flattened between the carina and the suture; carina slightly crenulated on the last whorl posteriorly; last whorl rounded at the periphery; base convex, deeply and broadly umbilicated, very finely corrugated; aperture elliptical, simple, heliciform; surface of the spire ornamented with 5 reddish

zones alternating with white punctate with rosy; surface of the base of the last whorl ornamented with regularly radiating costiform white maculations. Alt. 2, diam. 3 mill. (*Caramagna*.)

Assab, Red Sea.

Gibbula de Gregorii CARAMAGNA, Bull. Soc. Mal. Ital. 1888, p. 130, t. 8, f. 7.

M. BICARINATA Adams & Reeve. Pl. 59, figs. 51, 52.

Shell depressed-orbicular, very widely umbilicated; apex acute; whorls spirally bicarinated, the carinae distant, interspaces concave, spirally closely lineated, concentrically striated; brownish or yellowish, variegated with reddish flammules; carinae obliquely articulated with red; throat iridescent. (*Ads. & Reeve*.)

Eastern Seas.

Margarita bicarinata ADS. & REEVE. Zool. Voy. H. M. S. Samarang, Mollusca, p. 49, t. 11, f. 11a, b.

M. TIGRINA H. & A. Adams. *Unfigured*.

Shell globose-conical, perspective umbilicated; whorls $5\frac{1}{2}$, smooth, the superior ones bicingulate, the last whorl multi-cingulate, cinguli stronger above, closer and smaller beneath; umbilicus with concentric crenulated liræ within; aperture subquadrate-orbicular, inner lip nearly straight, posterior margin of outer lip subangulate; white, closely painted longitudinally with wide brown stripes.

(*H. & A. Ad.*)

Habitat unknown.

Minolia tigrina ADS., P. Z. S. 1863, p. 433.

M. BIANGULOSA A. Adams. Pl. 37, fig. 7.

Shell orbicular-conical, broadly umbilicate, smooth, brown, closely painted with longitudinal undulating lines; whorls planulate, angulate above, the last biangulate; sutures margined; base convex, concentrically cingulate; umbilicus perspective, its margin crenulated, its interior elegantly decussated by transverse and radiating lines. (*A. Ad.*)

Siam.

Margarita biangulosa A. AD., P. Z. S. 1854, p. 40.—*Margarita triangulosa* SOWERBY, in Reeve Conch. Icon., f. 26.

M. SOLARIIFORMIS Sowerby. Pl. 67, fig. 73; pl. 39, figs. 44, 45.

Shell orbicular, sublenticular, very thin; whorls 5, smooth, subplanulate, spirally very finely striate, pallid, painted with a very

minute white and brown articulation; aperture subquadrate; umbilicus large, deep. (*Sowerby*.)

San Nicolas, Zubu, Philippines. (Cuming.)

Margarita solariiformis SOWB., Malacological and Conchological Magazine, pt. i, 1838, p. 26; Conchological Illustr., *Margarita*, f. 8. G. B. SOWERBY, JR., in Reeve's Conch. Icon., Monogr. *Margarita*, f. 27.—*T. solariiformis* PHILIPPI, Conchyl. Cab., p. 244, t. 37, f. 1.

Adult specimens of what I take to be the true *solariiformis* are before me, and one is figured on pl. 67, fig. 73. The shell is elevated; bluntly conic, whorls 6, the earlier two rounded, the rest with a strong angle on the upper surface, the last with another at the periphery. There are slight growth-lines but no spiral striæ above the periphery; the base has a beaded carina bounding the very deep umbilicus, and outside the carina about 7 smooth concentric liræ becoming smaller toward the periphery. The umbilicus is clathrate inside, funnel-shaped and has about 6 spiral liræ crossed by numerous radiating riblets. The aperture is rounded-rectangular, pearly and pinkish inside. Alt. 9, diam. 9 mill. The color is purplish-brown, with numerous narrow, irregular or zigzag radiating light streaks. The upper surface of the earlier whorls is seen to be slightly fluted under a lens, on the flat portion above the superior carina. The iridescence of the pearl often shows through the outer coat on the spire. There are often a few spiral raised threads in the concave portion between the two carinæ on the body-whorl.

This is one of those forms which might be equally well placed in true *Solariella*.

M. EUDELI Deshayes. Pl. 66, figs. 2, 3.

Shell small, discoidal-conical, subturbinate, apex rather obtuse, spire short; whorls 5, slowly increasing, transversely very minutely striate-granulose; last whorl large, depressed beneath, the base umbilicate. Aperture semilunar, little oblique; shell whitish-rufous, elegantly marbled with chestnut spots. Alt. 3, diam. 5 mill. (*Desh.*)

Island of Réunion

Trochus (Margarita) eudeli DESH., Moll. de L'île de la Réunion, p. 75, t. 8, f. 9, 10, 1863.

M. CASTA G. & H. Nevill. Pl. 60, figs. 21, 22.

Shell conoidal, glabrous; white, ornamented with brown, sometimes in distant broad flames, sometimes in minute close reticulations; base white, on the outer half only streaked or marbled with

brown; whorls 5 to 6, angular, spirally keeled, keels prominent, 4 or 5; outer half of the base with five distant impressed spiral lines; round, and entering into the open deep umbilicus some six spiral rows of close oblique granules, the outer row of which is the largest.

Alt. $7\frac{1}{2}$, diam. 9 mill. (*Nevill.*)

Ceylon.

Trochus (Solariella) castus NEVILL, Journ. Asiat. Soc. Bengal, 1874, p. 27, t. 1, f. 4.

May perhaps belong elsewhere.

M. CANALICULATA E. A. Smith. Pl. 60, figs. to the right of 21, 22.

Shell small, broadly umbilicated, pearly, beautifully prismatic; spire depressed-conical; whorls 5, the first 2 smooth, the remainder spirally lirate, and ornamented beneath the channelled sutures with a series of white tubercles, here and there marked with brown; last whorl encircled by chestnut-dotted carinæ, base with a purple-brown zone; umbilicus perspective, margined by a tubercular cord; aperture subcircular. Alt. 2, diam. 3 mill. (*Smith.*)

Whydah, W. Africa.

Solariella canaliculata E. A. SMITH, P. Z. S. 1871, p. 736, t. 75, f. 28.

A very pretty pearly species, with a channelled suture and with a row of tubercles below it; about every seventh one is chestnut, the rest whitish. The umbilicus is girt with a somewhat tubercular chord, and a zone of purplish brown. (*Smith.*)

M. BELLARDII ISSEL. Pl. 47, figs. 96, 97.

Shell minute, thin, orbicular-depressed, oblique, narrowly umbilicate, transversely minutely costulate, pale rose-color, tessellated with purple; spire obtuse; whorls $4\frac{1}{2}$, rapidly widening, slightly convex, planulate at the sutures, separated by impressed sutures; last whorl large, rounded on the base; aperture dilated, ovate-triangular; peristome simple, acute. Alt. 2, diam. $2\frac{1}{2}$ mill. (*Issel.*)

Suez.

T. bellardii ISSEL, Malacologia del Mar Rosso, p. 224. t. 2, f. 12. (1869.)

M. TURRITELLINA Ancy. Unfigured.

Shell trochiform, turritted, thick, pale brownish-gray, flammulate with white, pervious-umbilicate; whorls 6, elevated, apex mucronate; whorls separated by a profound suture, at the periphery unicarinate,

the carina acute, crenulated; last whorl angulated, tricarinate, the lower carina less acute, surrounding the funnel-shaped, deeply longitudinally and spirally striated umbilicus, strongly crenated, bounded by an impressed line; two upper carinae acute, separated by concavo-flat interspaces. Aperture suboblique, rounded; peristome acute, not expanded nor reflexed. Alt. $4\frac{1}{2}$, diam. 4 mill. (*Ancey.*)

Sumatra.

This curious form was discovered by Capt. Martin, in 1842, on the coast of Sumatra. It is allied to the *Solariella solariiformis* Hanl. of Cochin (Malabar), but is more elevated, more acuminate, more angular than the latter, etc. (*Ancey.*) The types are in the collections of Schaufuss, Jousseume and Ancey.

Solariella turritellina C. F. ANCEY, Le Naturaliste, iii, p. 390, April, 1881. (Paris.)

M. LÆVISSIMA Von Martens. *Unfigured.*

Shell broadly umbilicated, depressed conoidal, sculptured with very fine, hardly visible spiral striae, otherwise smooth, very shining, ashen-whitish, painted with yellowish confluent flammules above and at umbilicus; whorls $5\frac{1}{2}$, slightly convex, separated by simple sutures, the last subplanate at base; umbilicus cylindrical; aperture diagonal, rounded-trapezoidal, peristome simple, incomplete, the columellar margin straightened, forming an obtuse angle where it joins the basal lip.

Alt. 8, diam. maj. 13, min. 11 mill.; aperture, alt. 7, diam. $6\frac{1}{2}$ mill. (*Mart.*)

South Africa, 33° 59' s. lat.; 50 ft. depth.

Trochus levissimus MART., Sitzungsab. Gesellsch. naturf. Freunde, 1881, p. 65.

Recalls the wide-umbilicated forms of Northern Margarita, but is easily separated from them by the beautiful marking. This and the almost perpendicularly entering umbilicus shows likeness to the subgenus *Minolia*, but the umbilicus of our snail is not encircled by a callous. Operculum thin, horny, with 6–7 whorls. (*Martens.*)

[The following six species form a little group to which I gave the name *Conotrochus*. I believe the species to belong to *Minolia*.]

M. MARIEI Fischer. Pl. 35, fig. 11.

Shell minute, narrowly but profoundly umbilicated, conical-turritid; whorls 7, convex, separated by deep sutures; the first

obtuse, subdepressed, decussated; the following are ornamented with sublamellose radiating striae, bicarinate below, pale yellowish, ornamented with greenish or chestnut flammules, and white dots; last whorl angulated, bicarinate in the middle, the carinae subgranose; base concentrically lirate; aperture circular, descending; lip thin, acute. Alt. 10, diam. 5 mill. (*Fischer.*)

Island of Mayotte, Comoro Archipelago.

T. (Gibbula) mariei FISCHER, Journ. de Conchyl. 1886, p. 72, t. 1, f. 5.

M. HOLDSWORTHANA G. & H. Nevill. Pl. 40, fig. 24.

Shell small, narrowly but deeply perforate, conical-turritid, thin, lusterless, whitish, mottled with greenish-brown above, base densely marked with dark brownish or greenish; spire elevated, apex acute, yellowish, sutures profound; whorls 5, the median portion encircled by three prominent keels, the upper two visible on the spire; base with a few coarse but not deep spiral sulci, carinated around the funnel-shaped umbilicus; aperture subcircular, iridescent within; lip fragile, columella thin, concave; umbilicus with several obscure spiral sulci inside. Alt. 4-4½, diam. 3½-3¾ mill.

Ceylon; Singapore.

Gibbula holdsworthana G. & H. NEVILL, Journ. Asiat. Soc. Bengal, 1871, pt. 2, p. 3, t. 1, f. 18.—*Minolia variabilis* AD. P. Z. S. 1873, p. 207, t. 23, f. 10.

Numerous specimens collected by ARCHER, at Singapore, are before me. This is a broader species than *M. mariei*, more widely umbilicate, and differently sculptured. The oblique striae of increment are scarcely visible.

M. SUBPLICATA G. & H. Nevill. Pl. 40, fig. 34.

Shell turbate, thin, semipellucid, white; whorls 5, tubular, flat-tend at the suture, spirally ridged; ridges 3 on the penultimate whorl, very prominent, widely separated by deep interstices, on upper whorls transversely cancellated, on the last delicately spirally striated; whorls transversely plicate at sutures; base subconvex, narrowly umbilicate, ornamented by 4 spiral ridges, the two interstices next the umbilicus transversely costulate; aperture nearly circular, surrounded by a simple margin; inner lip moderately arcuate; inside slightly pearly. Alt. 5, diam. 4 mill. (*Nevill.*)

S. Province Ceylon.

S. sub-plicata G. & H. NEVILL, Journ. Asiat. Soc. Bengal, 1869, p. 159, t. 17, f. 1.

M. SINGAPORENSIS Pilsbry. Pl. 40, fig. 27.

Shell narrowly, deeply umbilicate, conical-turritted, thin, lusterless, whitish, with a series of obscure brownish blotches below the suture, and a chain of large brown blotches around the outer part of the base; spire conical, apex minute, acute; sutures deeply impressed; whorls about 5, very convex, those of spire bicarinate, the last whorl with two principal carinæ and several smaller ones on the base of the whorl, the entire surface very regularly strongly obliquely crispate-striate; aperture almost perfectly circular, in contact with the body-whorl for only a short distance, margins thin, outer and inner equally curved; umbilicus deep, funnel-shaped.

Alt. 3, diam. $2\frac{1}{2}$ mill.

Singapore.

Numerous specimens of this form, collected by Dr. ARCHER are before me. It belongs to the group including *M. holdsworthiana*, *M. subplicata*, *M. marici*—a group of minute elevated turritted shells, narrower and more elevated than *G. pisum* Phil. and its allies.

M. PANTANELLI Caramagna. Pl. 51, fig. 7.

Shell turbate, rather solid, red, umbilicate; whorls 5, sloping, angular; the first two smooth and scarcely visible, the rest ornamented with oblique lamellar minute striæ and tuberculate cinguli; beneath ornamented with three granulose whitish concentric cinguli, the upper two near each other, the third more distant, surrounding the umbilicus; suture nearly covered; umbilicus profound, funnel-shaped, crenate; peristome simple, continuous; aperture subrotund, whitish. Alt. 3, diam. $2\frac{1}{2}$ mill. (*Caramagna.*)

Assab, Abyssinia.

G. pantanellii Caramag., Bull. Soc. Mal. Ital. xiii, p. 128 (1888). Evidently allied to the preceding species, but distinguished by the coloration, granulose carinæ, crenated umbilicus, etc.

M. SEMIUSTA Fischer. Pl. 41, fig. 36.

Shell very small, profoundly umbilicated, conoidal; whorls 5 to 6, separated by impressed sutures, rather convex, planulate at the sutures, subgradate, the first white the remainder brownish-red, streaked with white, ornamented with a zone of chestnut interrupted with white above, spirally lirate, and elegantly clathrate with lamel-

lose radiating striæ; spiral cinguli 4 on the penult. whorl; last whorl elongated, convex, with a zone of white and chestnut spots at the periphery, convex beneath, whitish or maculate with chestnut, elathrate, with about 4 concentric liræ, aperture subrhomboidal, lip sub-duplicate within; columella a little arcuate; umbilical area funnel-shaped, spirally plicate, carinated at its edge.

Alt. $2\frac{1}{2}$, diam. 2 mill. (*Fischer*.)

“*Ouagap et Kua-Kue*” *New Caledonia*.

Trochus (Minolia) semiustus FISCHER, Journ. de Conchyl. 1879, p. 23; l. c. 1886, t. 1, f. 6.

Seems to belong to the group of species which I have called *Conotrochus* rather than to *Minolia* proper.

M. PHILIPPENSIS Watson. Pl. 36, figs. 15, 16.

Shell rather like *Trochus tumidus*, Mont., but with a broader base, more conical and less scalar, with a large open umbilicus and brilliant color. Sculpture: the shell is gathered into small regular flat puckers below the suture; these are weaker on the last whorl. The whole surface is covered with very fine oblique longitudinal striae. Spirals: there are very numerous fine, sharp, undulating scratches, which on the middle of the base are shallower and wider apart, but toward the umbilicus again become sharper and more crowded. Within the umbilicus are four or five somewhat beaded spirals, the first and strongest of which forms an umbilical carina. Color faintly iridescent all over, creamy white, flecked with zigzag lines of crimson, which on the upper whorls are narrow and regular, on the penultimate whorl are remote, and on the last are irregular, broken and crowded. On the base there are eleven to twelve elongated radiating crimson spots. The first three whorls are a pale orange-yellow. Spire rather high, scalar, apex small, bluntly pointed. Whorls $6\frac{1}{2}$, with a flat shelf below the suture, angulated at about one-fifth of their breadth, and rounded from the angulation to the suture. The last whorl is bluntly angulated at the edge of the rounded base. Suture strong, being slightly impressed and very distinctly marked by the angle at which the adjoining whorls meet. Mouth little oblique, round. Outer lip thin and sharp, not at all expanded. Inner lip thin and sharp, a very little patulous on the pillar, where it also retreats a little, so as to form a slight open sinus; brilliantly iridescent within. Umbilicus wide and pervious, and deeply impressed at the suture, which runs spirally up to the apex within.

Alt. 0·275 in. diam. 0·33, least 0·3 in. Mouth, height 0·15, breadth 0·14 in. (*Watson.*)

There is a *Margarita tasmanica* of Tenison-Woods, from Bass Straits, which from his description, seems to present some features of resemblance to this species; but he says of it that the upper part of the whorl is not angulated. Then *Trochus (Solariella) productus*, Fisch. (= *angulatus*, A. Ad.). This Port Philip species is much larger and higher. It approaches most nearly to *T. bellula*, Ang.; but that is larger, with the same number of whorls, has a transparently white apex, has the shoulder below the apex not flat nor drooping outwards, but gouged out as a concave depression; the last whorl is more spread out, and the base is without color, the umbilicus is wider and less deep, and the spiral which defines it is stronger, while there are no other spirals within it; the whole surface of the shell, too, is smooth, with a few strong clean-cut impressed spirals, instead of being closely and minutely fretted with spirals all over. (*Watson.*)

Off entrance to Port Philip, Australia. 33 fms. sand.

Trochus (Solariella) philippensis WATSON, Journ. Linn. Soc. Lond. xv, p. 92; Challenger Gasteropoda, p. 73, t. 6, f. 10.

M. LAMPRA Watson. Pl. 36, figs. 17, 18.

Shell depressedly conoidal, angulated at the periphery, rounded on the base, umbilicated, polished, finely sculptured, solid. Sculpture: the glossy surface is closely fretted with fine, curved, oblique, longitudinal scratches, crossed by very similar but slightly stronger and more equal spirals; these both are stronger near the suture and feebler on the base, when indeed, the spirals almost disappear. Color pellucid pale yellowish-white, with many narrow, opaque, pure white spirals, which are flecked with fine zigzag brown longitudinal lines, aggregated in spots, and most abundant near the suture. The strongest opaque spiral is at the periphery, and on it are minute linear interruptions of the fundamental color and very regularly recurring little brown spots, which are about half the width of their interspaces. On the base the brown spots are very few and minute. There is very little iridescence anywhere. Spire low. Apex minute and projecting. Whorls 6, depressed, equally curved, slightly angulated at the periphery, more flattened on the base than above, of regular, but rather rapid increase. Suture slightly impressed. Mouth small, rounded. Outer lip thin and perfectly simple. Inner lip porcelaneous, thick and flat, projecting in a

minute ear across the umbilicus, and having toward the point of the pillar a broad backward bevel, cut out of the thickness of the shell round the umbilicus. Umbilicus a shallow open depression, with a deep narrow hole in the center. Alt. 0·15 in., diam. 0·24, least 0·2. Mouth, height 0·13, breadth 0·1 in. (*Watson.*)

The specimen from which this species is described is not quite full grown. The whorls are not angulated, nor the umbilicus open, nor is the color ruddy, nor the texture thin as in *Trochus (Solariella) prodictus*, Fisch. From *Trochus (Solariella) vitiligineus*, Mke., from which it differs in these respects, but in a less degree, it may further be distinguished by its greater depression, its smaller mouth, its weaker sculpture, its greater glossiness, its feebler iridescence and its minute umbilicus. (*Watson.*)

Levuka, Fiji. 12 fms.

T. (Solariella) lamprus WATSON, Journ. Linn. Soc. Lond. xv, p. 93; Challenger Gasteropoda, p. 74, t. 6, f. 9.

M. ALBUGO Watson. Pl. 36, figs. 13, 14.

Shell small, conoidal, with a tumid conical base, bluntly bicarinate, umbilicate with a resinous luster, brown, flecked with crimson and white. Sculpture: very many irregular oblique faint lines of growth, with a few remote rounded spirals, which are very weak above, stronger on the base, and of which two at the periphery form a feeble double carina. Color: a pale transparent resinous brown, flecked below the sutures and at the periphery with alternate spots of white and crimson; the latter color runs in minute zigzag streaks down the shell; there are also, both above and on the base, a few delicate spirals of alternate crimson and white specks. Spire rather low, with curved profile lines and a blunt round apex. Whorls 5, rounded and sloping above, flat at the periphery, and tumid on the base. Suture linear and very slightly depressed. Mouth rather large, round. Outer lip thin. Inner lip thin, hollowed out backwards, and bending somewhat across the umbilicus. Umbilicus a broad shallow funnel, contracting to a small deep hole. Alt. 0·125 in.; diam. 0·2, least 0·15. Mouth (in consequence of obliquity), height 0·125, breadth 0·1 in. (*Watson.*)

This species differs from *Trochus (Solariella) lamprus* W., in being higher, with a larger mouth, and most of all in color and in sculpture. It is perhaps most like *Trochus (Solariella) vernicosus* Gould,

but that is flatter and has a much wider umbilicus. The name is derived from the white spots which fleck the shell.

T. (Solariella) albugo WATSON, Journ. Linn. Soc. Lond. xv, p. 94; Challenger Gasteropoda, p. 75, t. 6, f. 8.

Unfigured Species of Minolia.

SOLARIELLA UNDATA Sowerby. Testa subdepressa, umbilico rotundo usque ad apicem perforata, margaritacea, pallide rubescente, spiraliter tenuiter lirata, supra prope suturam angulata; medio anfractuum carina rotundato-angulata, angulis distanter rubro maculatis; interstitiis rubro undato-lineatis. (Sowb., P. Z. S. 1870, p. 251).

Agulhas Bank, S. Africa. (Mus. Taylor.)

Genus *CIRCULUS* Jeffreys, 1865.

Circulus JEFFREYS, Brit. Conch., iii, p. 315; Proc. Zool. Soc. 1883, p. 94.—FISCHER (as subgenus of *Gibbula*), Man. de Conchyl., p. 824.

Jeffreys's diagnosis of this group is as follows: Shell coin-shaped or forming a circular compressed disk, slightly nacreous or pearly; mouth quadrangular, with a discontinuous peristome; umbilicus very wide; operculum multispiral as in other genera of Trochidæ. The animal is unknown.

C. STRIATUS Philippi. Pl. 66, figs. 11, 12, 13.

Shell minute, discoidal, depressed above, broadly umbilicated beneath, subtransparent, quite solid, white; surface shining; spire depressed, composed of 4 to 5 convex whorls, traversed spirally by sharp narrow liræ, 7–9 in number on the upper part of the last whorl, half as many on the penultimate whorl, two or three on the next, the two upper whorls smooth; the inter-liral spaces delicately obliquely marked by growth striæ. The lowest ridge is placed just under the periphery, and is sometimes more prominent than the rest; suture impressed; whorls cylindrical, gradually enlarging, the last broadly concave beneath, and smooth save for slight radiating lines of growth; aperture oblique, rounded-quadrangular; peristome not continuous; columella arcuate, subreflexed at the umbilicus; outer lip slightly sinuous above; umbilicus broad, deep, showing all the whorls. Alt. .8, diam. 2.5 mill.

Mediterranean and Adriatic Seas; Atlantic Ocean, England to Morocco.

Valvata striata PHIL., Enum. Moll. Sicil., i, p. 147, t. 9, f. 3 (1836).—*Adeorbis striatus* SEARLES WOOD, Crag Mollusca, p. 137, t. xv, f. 7.—CHENU, Manuel, i, p. 352, figs. 2589, 2590.—*Adeorbis striatus* Phil. TASLE, Catal. Morbihan, p. 36.—*Cyclostrema striata* Phil. PETIT, Catal. Test. Mar., p. 111 (1869).—*Cyclostrema striatum* Phil. FISCHER, Actes Soc. Linn. Bord. 1869, p. 129.—GRANGER, Moll. de France, p. 142 (1885).—*Skenea striata* Phil. ARAD. et BEN. Conch. viv. mar. della Sic., p. 158 (1870).—*Circulus striatus* Phil. MONTEROSATO, Not. int. alle Conch. Medit., p. 31 (1872); Nuova Revista, p. 23; Enum. e Sinon., p. 20.—FISCHER, Brach. et Moll. du litt. oc. de France, p. 13 (1878).—JEFFREYS, Proc. Zool. Soc. Lond., 1883, p. 95.—BUCQUOY, DAUTZENBERG AND DOLLFUS, Moll. Mar. du Roussillon, p. 420, t. 51, f. 1, 2, 3 (1886).—*Delphinula duminyi* REQUIEN, Coq. de Corse, p. 64 (1848).—*Trochus (Circulus) duminyi* R  q. JEFFREYS, Brit. Conch. iii, p. 315; v, p. 203, t. 62, f. 5 (1865).—*Trochus duminyi* Req. WEINKAUFF, Conchyl. des Mittelmeeres, ii, p. 374.—*Skeneia striatula* WEINKAUFF, Journ. de Conchyl. 1862, p. 343.—*Delphinula costata* DANILO et SANDRI. Elenco nomin., p. 123 (1856).

This tiny shell has much the appearance of a *Cyclostrema*; from which genus, however, the 10 or 12 whorled corneous operculum and slightly nacreous interior separate it. The authors of "Les Mollusques du Roussillon" give as measurements, alt. 2, diam. 4 mill.! which is enormously larger than any I have seen, the largest of which is only 2½ mill. in diam. The species is found living from the littoral zone to considerable depths. It is found fossil in the pliocene (Crag) of England, and in Italy. The fossil forms described by Searles Wood as *Adeorbis supranitidus* and *tricarinatus* (Crag Moll., p. 137, 138, t. xv, f. 5, 6) are evidently closely allied. *Solarium philippii* Cantraine is also said to be synonymous.

The discoidal form, strong spiral ridges of the upper surface and concave smooth base, discontinuous peristome, etc., render the species easily separable from other known recent forms.

Genus NORRISIA Bayle, 1880.

Norrisia BAYLE, Journ. de Conchyl. 1880, p. 241.—FISCHER, Manuel de Conchyl., p. 825.—*Trochiscus* SOWERBY, Ann. and Mag. N. H. 1838, p. 96; and of most authors, not *Trochiscus* V. Heyden, Isis, 1826, a genus of Arachnida, nor *Trochiscus* Held, 1837, a section of Helices.

The position of this genus is a little uncertain. Troschel places it in the vicinity of *Gibbula*, and this is probably its natural position. Fischer includes it as a subgenus under *Gibbula*. The peculiar operculum and dentition suffice to give the group generic rank however, in my opinion. The dentition is figured by Dall (Am. Journ. Conch. 1871, pl. 13, f. 6). Young shells are strongly bicarinate, and have an umbilical rib like *Monilea*. The dentition is figured on pl. 50, fig. 9.

N. NORRISI Sowerby. Pl. 61, fig. 30.

Shell wide, depressed-turbinate; solid, nearly lusterless, smooth, save for light growth-lines and ill-defined spiral lines; reddish fawn-colored, black around the umbilicus; umbilicus large, contracted at its opening; greenish inside; spire low-conoidal; apex minute, subacute, spirally striate; when perfect, the apical whorls are variegated; sutures plain; whorls about 6, rapidly widening, nearly plane and sloping above; the last very large; aperture rounded-quadrangular, angular above, brilliantly nacreous inside; peristome thin, simple, columellar margin thickened at the base, and with a very obtuse tubercle there. Alt. 40, diam. 52 mill., or less.

Operculum circular, multispiral, nucleus central; edges of the whorls projecting outside, papery and rolled up like a spiral cord.

Cerros Id., L. Cal. north to ———.

Trochiscus norrisi SOWB., Ann. & Mag. N. H. 1838, p. 96.—GRAY, Zool. Beechey's Voy., t. 34, f. 14.—CHENU, Man. de Conchyl., i, p. 362, f. 2692.—CARPENTER, Rep. Brit. Asso. Adv. Sci. 1863, p. 665.—DALL, Amer. Journ. Conch., vii, t. 13, f. 6 (Dentition).—TROSCHER, Das Gebiss der Schn., ii, p. 243, t. 24, f. 15.—KEEP, West Coast Shells, p. 86, f. 82.—*Turbo norrisi* DESH. in Lam. An. s. vert, ed. 2, ix, p. 221.—PHILIPPI, Conchyl. Cab., p. 50, t. 12, f. 5.—REEVE, Conch. Icon., f. 54.—*Trochus norrisi* FISCHER, Coq. Viv. (Turbo), p. 45, t. 10, f. 1.—*Turbo rotellæformis* JAY, Cat., 3d ed., 1859, p. 3, t. 1, f. 2, 3.—*Trochiscus convexus* CARPENTER, Ann. and Mag. N. H. xv, 1865, p. 180.

A form very distinct from all others. It is an abundant species about San Diego, Cal. I do not know how far northward it ranges. The dimensions given above are for the largest specimen I have seen. Fischer quotes it from Oregon.

Genus LIVONA Gray, 1842.

Livona GRAY, Guide Syst. dist. Moll. Brit. Mus., p. 156.—H. and A. AD., Genera, i, p. 412.—Fischer, Mannel de Conchyl., p. 825.—TROSCHEL, Das Gebiss, ii, p. 223.—*Meleagris* MONTFORT, Conch. Syst., ii, p. 207 (not *Meleagris* Linn.).—*Cittarium* PHILIPPI, Zeitschr. f. Mal. 1847, p. 21; Handb. Conchyl. u. Mal., p. 210, 445 (1853).

Livona is peculiar in the great number of lateral teeth to the radula, 9 on each side of the rhachis (see Troschel, Gebiss, p. 223, pl. 21, fig. 10). Jaws composed of rhombic elements, as in other Trochids. The operculum is thin, smooth and concave outside, shining and rich chestnut color inside, the half attached to the foot olive-green, duller; the nucleus is central; whorls about 12. The epipodial line bears very numerous cirrhi,—also a peculiar character.

L. *PICA* Linne. Pl. 61, fig. 24.

Deeply umbilicate, turbinata, solid, lusterless, black with maculations or zigzag flammules of white. Spire conoidal, apex eroded; whorls about 6, convex, the last depressed-globose, large; aperture semicircular, oblique, nacreous inside; outer lip simple, columella arcuate, produced above in a heavy porcellanous callous deposit, half-surrounding the umbilicus and deeply notched in the middle. Umbilicus deep, spirally bicostate inside.

Alt. 110, diam. 120 mill., usually smaller.

West Indies; North to Bermuda and Charlotte Harbor, Fla., South to Panama and Trinidad.

Turbo pica LINNE, Syst. Nat., xii, p. 1235.—LAMARCK, An. s. vert., vii, p. 44.; ed. Desh., ix, p. 193.—REEVE, Conch. Icon., f. 24.—*Trochus pica* PHILIPPI, Conchyl. Cab., p. 331.—CHENU, Manuel de Conchyl., p. 356, f. 2638.—FISCHER, Coq. Viv., p. 64, t. 1.—*Livona pica* GRAY, Guide Syst. Dist. Moll. Brit. Mus., p. 156, and of Authors generally.—*T. (Livona) picoides* GOULD, Otia, p. 185.—CARPENTER, Moll. Western N. A., p. 21, 23, 138.

A well-known Antillean species. The upper surface is often entirely black. Young shells, or well-preserved adults, have the spire whorls sculptured by oblique folds cut by a few spiral sulci; the periphery and base in the half-grown shells are spirally lirata. The lip is edged inside by black, or black and white. There is no well authenticated Pacific coast record.

Genus PHOTINULA H. & A. Adams, 1854.

Photinula H. & A. AD., Genera Rec. Moll., i, p. 427; and of recent authors.—*Photina* H. & A. AD., P. Z. S. 1851, p. 191 (not of Burmeister).—*Margarita* (in part) of authors (not of Leach).

The genus *Photinula* was instituted for *Margarita*-like shells with imperforate axis, confined to Antarctic America in distribution. The species are few and very variable.

P. TÆNIATA Wood. Pl. 44, figs. 18, 19. Pl. 64, fig. 37.

Shell imperforate, depressed, conoid, thin, shining, white, unicolored or with numerous spiral pink stripes and lines; surface smooth; spire conical, apex acute, the first three whorls encircled by three coarse liræ; whorls 6, the last rapidly increasing; aperture oblique, rounded-rhombic, with a thin, finely folded, brilliantly iridescent layer of nacre inside; peristome simple, thin; columella broad, reflexed, appressed, arising from a small pad of callous on the base of the shell. Alt. 21, diam. 26 mill.; alt. 17, diam. 23 mill.

Sts. of Magellan; Falkland Is.

Trochus tæniatus WOOD, Index Test. suppl., t. 5, f. 12.—PHILIPPI, Conchyl. Cab., p. 251, t. 37, f. 12.—FISCHER, Coq. Viv., p. 319, t. 100, f. 2.—*Margarita tæniata* SOWB. Conch. Ill., f. 2; in Reeve, Conch. Icon., xx, f. 4.—REEVE, Conch. Syst., t. 227, f. 2.—*T. bicolor* LESSON, Voy. de la Coquille, p. 345, t. 16, f. 3.—*Photinula tæniata* CHENU, Manuel, i, p. 361, f. 2681.—*Margarita cærulescens* KING, Zool. Journ., v, p. 346, no. 54.—SOWERBY in Reeve, Conch. Icon., xx, f. 12.—*Trochus cærulescens* PHILIPPI, Conchyl. Cab., p. 250, t. 37, f. 11.—WATSON, Rept. Challenger Gasterop., p. 68.—*Tr. lineatus* PHIL., Arch. f. Naturg. 1845, p. 56 (not of Da Costa).—*Margarita maxima* HOMBRON et JACQUINOT, Voy. au Pole Sud, p. 59, pl. 14, f. 32, 33 (not *T. maximus* Koch).—*Photina coerulea* A. AD., P. Z. S. 1851, p. 191.—*Photinula cærulescens* ADS., Genera, i, p. 427.—*T. hombroni* FISCHER, Coq. Viv., p. 320, t. 100, f. 3.—*T. purpuratus* FORBES, P. Z. S. 1850, p. 372, t. 11, f. 11.

A large handsome species, easily recognized by its spiral red stripes on a white ground.

Var. CÆRULESCENS King. Pl. 44, figs. 18, 19.

More depressed; aperture more oblique; color ashen or fleshy, with spiral lines and bands of blackish-blue.

P. EXPANSA Sowerby. Pl. 39, figs. 51, 52.

Shell imperforate, depressed-conoidal, thin, shining, of a light olivaceous tint or somewhat tinged with pink; surface smooth; spire conoidal, acute; sutures slightly impressed; whorls about $4\frac{1}{2}$, rapidly widening, the last large, rounded at periphery, a little impressed or margined below the suture; aperture large, rounded, angular above, green and iridescent inside; columellar margin a little straightened; umbilico-columellar tract slightly excavated.

Alt. 9, diam. 12 mill.

Falkland Is., Kerguelen Id.; Sts. of Magellen; South Georgia.

Margarita expansa SOWB. Mal. and Conch. Mag., p. 24, and Conch. Illustr., figs. 16, 17.—*Trochus expansus* PHIL. Conchyl. Cab., p. 254, t. 37, f. 18.—*T. (Photinula) expansa* E. A. SMITH, Moll. Kerguelen, Philos. Trans. 1877.—WATSON Challenger Gasterop., p. 69.—*Photina expansa* A. AD., P. Z. S. 1851, p. 191.—TAPPARONE CANEFRI, Zool. Viaggio 'Magenta,' p. 67.—*Photinula expansa* H. & A. AD., Genera, i, p. 428.—*T. (Margarita) hillii* FORBES, P. Z. S. 1850, p. 272, t. 11, f. 10.—*Margarita (Photinula) expansa* VON MARTENS & G. PFEFFER, in Natur. hist. Mus. zu Hamburg, Pagenstecher's Bericht für 1885, p. 100, t. 2, f. 10a, b, c, d. (1886.)

P. VIOLACEA King. Pl. 39, figs. 42, 43.

Shell imperforate, orbicular-conic, thin, smooth, purplish-pink; whorls 4, tumid; suture scarcely impressed; aperture rounded-quad-rangular, angular above, subangular at base of columella; columella subthickened, subarcuate; umbilico-columellar tract excavated.

Alt. 10, diam. 10 mill.

Straits of Magellen; Orange Harbor, Tierra del Fuego.

Margarita violacea KING, in Zool. Journ., v, p. 346 (1832-34).—SOWERBY, Mal. and Conch. Mag., i, p. 24 (1838); and Conch. Ill., figs. 11, 12.—SOWB. in Reeve, Conch. Icon., vol. xx, f. 5.—*Tr. violaceus* PHIL., Conchyl. Cab., p. 254, t. 37, f. 19.—? *Margarita magellanica* GOULD, U. S. Expl. Exped. Moll., p. 192, atlas, f. 228.—*Margarita persica* GOULD, *l. c.* p. 193, atlas, figs. 230.—*Margarita magellanica (de novo)* HOMBRON et JACQUINOT, Voy. au Pole Sud, Zoologie, vol. v, p. 59, atlas t. 14, f. 29-31 (1854).

This form seems to be of a deeper pink shade than *P. expansa*. It is somewhat more conical, with smaller aperture. I am not certain of the identity of *M. magellanica* Gld. The original figures

are copied on pl. 44, figs. 14-17. Gould's figures of *M. persica* are also given, pl. 44, figs. 23, 24.

The color is sometimes pale yellowish-brown.

P. SIGARETINA Sowerby. Pl. 39, figs. 34, 35.

Shell orbicular-depressed, thin, smooth, reddish, whorls 3, tumid, a little depressed above, the last large; suture inconspicuous; aperture large, suborbicular, suboblique; columella a little widened, flat, arcuate, with an indistinct longitudinal furrow. (*Sowb.*)

Port Famine, Sts. of Magellan.

Margarita sigaretina SOWB., Mal. and Conch. Mag., i, p. 24 (1838); Conch. Ill., f. 14.—SOWB., JR., in Rve., Conch. Icon., f. 10.

P. RINGEI Pfeffer. *Unfigured.*

Shell rather solid, semipellucid, shining, bluish-white gray, encircled above the periphery (rarely below) with very narrow lines and bands of bluish-black; subheliciniform, subdepressed-turbinate, the apex acute; whorls little convex, with moderate suture; the last whorl a little descending, a little flattened above, rounded beneath; aperture rounded-subquadrangular, upper, outer and lower margins continuously curved, thin, acute, columellar oblique, passing with an angle into the base. No umbilicus. Young specimens have a spiral excavation at the place of the umbilicus, which becomes in the adult evanescent, the umbilical tract being entirely occupied by a large white callous, as in *Rotella*, and there is only a slight concavity in the place of the umbilicus. The umbilical callous always remains concave. A thin irregularly S-shaped callous connects the terminations of the aperture.

Alt. 12·3, diam. maj. 19, min. 14·5 mill.; apert. lat. 9·6, long. 11·7 mill. (*Pfeffer.*)

Straits of Le Maire, between Staten Id. and Tierra del Fuego, in 70 fms.

Photinula Ringei GEORG PFEFFER, Verhandl. des Vereins f. naturwissensch. Unterhaltung zu Hamburg, vol. vi, p. 113 (1887).

This new species stands intermediate between the genera *Rotella* and *Photinula*. It is nearest to *P. coerulescens* King, but that snail is in general, as well as in each separate whorl, much more convex, and resembles in the columella, which is not so oblique, the young, rather than the adult of the new species; and finally, the spiral stripes extend over the entire surface of the last whorl in *P. coerulescens*.

Unfigured and undetermined Photinula.

PHOTINA NIGRA A. Adams. Shell depressed-conical, imperforate, solid, black, smooth; whorl subrotund, transversely sulcate; longitudinally obliquely substriate; last whorl subangulate; umbilical region impressed, covered by a white callous.

(*Ad.* in P. Z. S. 1851, p. 192.)

Habitat unknown.

PHOTINA FUSCA A. Adams. Shell oblique, subconical, shining, variegated with brown; whorls a little convex, transversely sulcate, the last subangulate; aperture subrotund, inside green iridescent.

(*Ad.* in P. Z. S. 1851, p. 192.)

Habitat unknown.

PHOTINA SANDWICHIANA A. Adams. Shell orbicular-conic, imperforate, smooth, whitish, maculated with green and brown; whorls rounded, the last subangular; apex rosy; aperture open, orbicular, green and pearly inside; labium white; umbilicus covered by a white callous. (*Ad.* in P. Z. S. 1851, p. 192.)

Mataineka, Sandwich Is.

This is not the *Margarita sandwichiana* Ad. of Sowerby, Jr. (*Reeve's Conch. Icon.*, f. 8), for that species is umbilicated.

PHOTINULA QUÆSITA A. Adams. Shell orbiculate-conic, spire a little elevated, umbilical region deeply impressed, umbilicus covered by a white callous; fleshy-reddish, at the sutures radiately clouded with chestnut, the periphery ornamented with oblique white and chestnut spots; whorls $5\frac{1}{2}$, convex, transversely liræ, the upper liræ beaded, lower ones simple; last whorl rounded-angular at the periphery; aperture subcircular, sulcate and vividly iridescent inside. Alt. 14, diam. 18 mill.

Aniwa Bay, Tatiyama, Kîno-O-Sima, Japan 17 fms.

Ann. & Mag. N. H. 1864, vol. xiii, p. 140.

A doubtful member of this group.

PHOTINULA VIAGINALIS Rochebrune et Mabilley.

Shell imperforate, depressed orbiculate, rather thick, solid, subopaque, destitute of cuticle or color, decussated by slightly conspicuous striæ and slightly prominent liræ; spire minute, a little convex, scarcely prominent; apex minute, obtuse, submamillated; whorls $5\frac{1}{2}$, plane at the sutures, then a little convex, irregularly (the first rapidly, following very rapidly) increasing, separated by

distinct sutures; last whorl large, subcomplanate above, at the periphery angularly rounded, not descending at the aperture, flattened beneath, very elegantly and minutely lirate and closely radiately striate.

Alt. 18, diam. maj. 19, min. 15 mill. (*R. & M.* in Bull. Soc. Philomathique de Paris, 7th Ser., vol. 9, 1885, p. 104).

Sta. Cruz, Patagonia.

PHOTINIA HYADESI Rochebrune et Mabilie.

Shell covered-imperforate, orbicularly trochiform, subdiaphanous, rather solid, shining, grayish flesh color, clathrulate with little evident distant liræ and extremely narrow striæ; spire elevated, conic-pyramidal, distinctly lirate (the liræ acute, resembling carinæ); apex minute, somewhat obtuse; whorls $6\frac{1}{2}$, convex, irregularly (the first slowly, subregularly, the remainder very rapidly) increasing; separated by a narrowly margined impressed suture; last whorl large, rounded-sloping above, at the periphery obtusely angulated, planulate beneath, and ornamented with radiating striæ and 3-4 liræ, not descending at the aperture; aperture oblique, lunate, rounded; peristome acute; columella deeply twisted, columellar margin thickened in a white, shining, very narrow, umbilicus-concealing callous; outer margin slightly, basal well rounded.

Alt. 10, diam. maj. 21, min. 14 mill. (*R. & M.*, l. c., p. 105.)

Terra del Fuego.

PHOTINULA DETECTA Rochebrune et Mabilie.

Shell imperforate, orbiculate-convex, a little thick, destitute of cuticle, sub-rudely striate; spire moderate, conical, little prominent; apex minute, subpapillar; whorls 6-7, rounded-convex, irregularly (embryonic sensibly, following very rapidly, last more rapidly) increasing, separated by subcanaliculate sutures; last whorl largest, rounded-sloping, obscurely angulate at the periphery, not descending at the aperture; base scarcely convex, at the umbilicus entirely covered, impressed, and with 5-6 lines; aperture oblique, transversely oblong; peristome straight, acute; margins distant, joined by a slightly thickened calcareous lamina; columella twisted, thick, emitting a narrow callous; outer margin well and elongately arched.

Alt. 11, diam. maj. 24, min. 20 mill. (*R. & M.*, l. c., p. 105.)

Around Sta. Cruz, Patagonia.

PHOTINULA RESURRECTA Rochebrune et Mabilie.

Shell orbiculate-depressed, imperforate, conical, subopaque, solid; under a tawny, thin, rather caducous cuticle, it is white, scarcely shining, decussated by very fine striæ and very minute spiral lines; spire conical, little prominent; apex minute, subacute; whorls $6\frac{1}{2}$, regularly and obviously increasing, separated by an impressed suture (first 3 whorls a little convex); last whorl large, subdepressed-sloping, obtusely angular at the periphery, scarcely descending at the aperture; subconvex-plane beneath and distinctly lirate; aperture oblique, oblong, depressed; columella callous, oblique, obscurely dentate at the base; collumellar margin thick, oblique, emitting a small thickened callous, entirely closing the umbilicus.

Alt. 12, diam. maj. about 25, min. 20 mill. (*R. & M., l. c., p. 106.*)

Santa Cruz, Patagonia.

PROTINULA PRUINOSA Rochebrune et Mabilie.

Shell imperforate, subglobose-conical, a little thick, solid, violaceous, ornamented with irregular oblique striæ and decussated with evanescent lines, only visible under a lens; spire turbinate, prominent, apex minute, shining, subacute; whorls 5-6, convex, regularly rapidly increasing, separated by impressed narrowly margined sutures; last whorl large, above sloping, then rounded, at the periphery subearinated, at the aperture scarcely descending; aperture oblique, lunate, transversely oblong, obscurely lirate inside, shining; peristome simple, acute, margins subparallel, outer subsinuous, basal arcuate, columellar incurved; columella twisted, incurved, a little thick, callous, forming an obtuse angle at the base, and emitting a thick, white, shining, slightly dilated callous closing the umbilicus, and bipartite by a longitudinal sulcus.

Alt. 7-9, diam. maj. 11-14, min. 10-14 mill. (*R. & M., l. c., p. 106.*)

Santa Cruz and Punta Arenas, Patagonia.

PHOTINULA GAMMA Rochebrune et Mabilie.

Shell imperforate, orbicular-pyramidal, rather thin, solid, opaque, shining, whitish or buff, ornamented with red lines, the upper beaded, the lower simple, continuous; spire conic-pyramidal, prominent, apex subacute, red; whorls $5\frac{1}{2}$ -6, depressed-planulate, rapidly and regularly increasing, separated by a linear, scarcely perceptible suture; last whorl large, sloping above, compressed-rounded at the periphery, subplanulate beneath; aperture little oblique, lunate,

ovate-subtriangular, pearly inside, and more or less zoned with green lines; margins joined by a very thin fulvescent lamina; outer margin at first nearly straight, then curved, columellar subthickened, very narrowly calloused at the insertion, joining the basal margin in an obtuse angle; columella elongated, intorto-curved.

Alt. 7, diam. maj. 13, min. 11 mill. (*R. & M., l. c., p. 107.*)

Punta Arenas, Patagonia.

PHOTINULA PARADOXA Rochebrune et Mabilie.

Shell orbicular-conic, covered imperforate, thin, solid, subdiaphanous, grayish-ruddy or white, zoned with red lines or unicolorous, smooth, finely striate under a lens; whorls 6, a little convex, plano-depressed at the suture, rapidly increasing, separated by a linear submargined suture, the last largest, depressed rotund, at the periphery scarcely obtusely angled, impressed around the closed umbilicus, at the aperture scarcely descending; aperture oblique, lunate, transversely ovate, above scarcely angled, at the base rounded; columella decidedly arcuate, emitting a white callous which closes the umbilicus and is bipartite by a sulcus.

Alt. 6-7, diam. maj. 11-13, min. 9-11 mill. (*R. & M., l. c., p. 107.*)

South of Cape Horn.

PHOTINULA HALMYRIS Rochebrune et Mabilie.

Shell imperforate, globose-conic, rather thin but solid, shining, whitish or reddish, vivid green at summit, smooth; spire conical, apex very minute, subpapillar, acute; whorls 6, convex, sensibly increasing, separated by an impressed suture; last whorl large, convex-sloping, obtusely carinate at base, subplanulate beneath, deeply descending at the aperture; aperture slightly oblique, lunate, transversely ovate, above narrowly acute, below produced-rounded; columella well arched, a little thick, emitting a very narrow white callous which covers the umbilicus; outer margin at first nearly straight, then well arched, acute, scarcely thickened.

Alt. 7-8, diam. maj. 10-11, min. 9-10 mill. (*R. & M., l. c., p. 108.*)

Beagle Channel.

P. viaginalis, *hyadesi*, *detecta*, *resurrecta* and *pruinosa* have decussated surface and may perhaps prove to be varieties of one species. All published information upon these forms is given in the above translations of the original diagnoses.

Genus MARGARITA Leach, 1819.

Margarita LEACH, Thomson's Annals of Philosophy, xiv, p. 202 (1819); Appendix to Capt. Ross's Voyage, H. M. S. Isabella and Alexander, p. 59.—BRODERIP and SOWERBY, Zool. Journ., iv, p. 363.—SOWERBY, Mal. and Conch., Mag. i, p. 24; and of authors generally (not *Margarita* Leach, Zool. Misc., i, p. 107, 1815, = *Avicula*).—*Margarites* Leach MS. 1819, GRAY, Ann. and Mag. N. H. xx, p. 268 (1847).—*Eumargarita* FISCHER, Manuel de Conchyl., p. 825 (1885).—*Valvatella* GRAY, Guide Syst. dist. Moll. Brit. Mus., p. 157, 1857 (type *M. grænlandica* = *undulata* Sby.).

"In 1814, Leach used the name *Margarita* for a section of *Avicula* which had already received several names. The name *Margarita* was therefore a synonym. In 1819, he used the same name, this time for a valid genus; but apparently recognizing that this might cause confusion, he changed the termination in a work which he had in press in 1820, and which was interrupted by his death. This work was published some thirty years later by Dr. J. E. Gray.

"The second use of a generic name once fallen into synonymy, although not forbidden by the accepted rules for nomenclature, is greatly to be deprecated; yet when it has occurred and when the second application of the name is universally unchallenged for more than half a century, and the original application never was in use and has been absolutely ignored, I can see no benefit likely to accrue to science from a change of names."

The history of the name *Margarita*, briefly given in the above extract from Dr. Dall's Report on 'Blake Gastropoda,' justifies us, in my opinion, in retaining that name for the present group.

The species of *Margarita*, like all boreal shells, are excessively plastic and variable. Many of them are circumpolar in distribution. They were first monographed by the elder Sowerby in 1828, and figured in the 'Conchological Illustrations.' Philippi included the species in his monograph of *Trochus* in Küster's Chemnitz, but he recognizes many forms which have no real specific characters. Mr. G. B. Sowerby, Jr., monographed the group in Reeves' Iconica, vol. 20. He confuses true *Margarita* with *Photinula*, *Solariella* and *Minolia*; and the work, on account of the numerous and egregious blunders it contains, is worthless.

M. HELICINA Fabricius. Pl. 64, figs. 45, 46, 47; pl. 39, fig. 63.

Shell umbilicate, thin, depressed-conoidal, flesh-colored, with paler at periphery and below the suture, fading into corneous around

the umbilicus; surface very bright, shining, polished, and smooth except for fine subobsolete concentric lines around the umbilicus; spire conoidal; apex minute but obtuse; suture impressed; whorls about 5, convex, the last very rapidly widening, somewhat descending toward the aperture; aperture rounded, oblique, angular above, nacreous inside, the pearly iridescence often visible through the shell; umbilicus narrow, profound, its opening regularly curved, not separated from the base by a carina.

Alt. 6, diam. 7 mill.; alt. 4, diam. 5 mill.

England, Scandinavia, New England, northward to Spitzbergen, Greenland and Behring Straits. (West America south to Washington Territory?)

Turbo helycinus O. FABR. Fauna Groenland., p. 393.—*Margarita helicina*, MÖLLER, Ind. Moll. Grœnl., p. 8.—LOVEN, Ind. Moll. Scand., p. 20.—GOULD (Binney's ed.), p. 281, f. 542.—SARS, Moll. Reg. Arct. Norveg., p. 132, t. 21, f. 3; t. iii, f. 7, 8 (dentition).—SOWERBY in Reeve, Conch. Icon., f. 15.—*Trochus helycinus* FORBES & HANLEY, Hist. Brit. Moll. ii, p. 531, t. 68, f. 4, 5; t. 74, f. 10; t. 200, f. 4 (animal).—JEFFREYS, Brit. Conch., iii, p. 295; v. t. 61, f. 4.—PHILIPPI, Conchyl. Cab., p. 250, t. 37, f. 10.—*Tr. neritoideus* GM. teste Forbes & Hanley.—*Turbo margarita* MONTAGU, Test. Brit. suppl., p. 143.—TURTON, Conch. Diction., p. 229.—LOWE, Zool. Journ. ii, p. 107, t. 5, f. 10, 11.—*Helix margarita* LASKEY, Mem. Werner Soc. i, p. 408, t. 8, f. 5.—FLEMING, Encyc. Edin., t. 203, f. 9 (teste F. & H.).—*Trochus margarita* PHILIPPI, Conchyl. Cab., p. 248, t. 37, f. 7.—BROWN, Illust. Conch. Gt. Brit., p. 17, t. 10, f. 28, 29.—*Margarita vulgaris* LEACH, mss. in Sowerby, Mal. and Conch. Magazine, p. 24.—SOWERBY, Conch. Ill. *Margarita*, f. 13.—? *Margarita arctica* LEACH in Ross's Voyage of Discovery of H. M. S. Isabella and Alexander, to Baffin's Bay, etc., Appendix no. ii, p. 61 (first species of *Margarita*.), 1819.—GOULD, Invert. of Mass., p. 255, f. 163.—SOWB., Mal. and Conch. Mag. i, p. 25; Conch. Ill., f. 6.—PHILIPPI, Conchyl. Cab., p. 248, t. 37, f. 8.—DEKAY, Mollusca of New York, p. 108, t. 6, f. 107.—SOWB. in Rve. Conch. Icon., f. 19.—*Turbo inflatus* TOTTEN, Silliman's Journ. Sci., xxvi, p. 368, f. 5.—*Marg. helicoides* BECK MS. teste Sowb.—*Margarita companulata* MORSE, Mem. Bost. Soc. N. H. i, p. 284, t. 7, f. 15.—BINNEY'S Gould, Inv. Mass., p. 282, f. 543.—*Tr. borealis* PHILIPPI, Conchyl. Cab., p. 283, t. 42, f. 1.—*M. arctica*

MIDDENDORFF, Mal. Rossica, ii, p. 69.—*M. helicina* Fabr., KRAUSE, Archiv f. Naturg. 1885, p. 262.

This species is very abundant. It may be known by the smooth surface, lightly spirally striate around the umbilicus, the rather narrow umbilicus, etc.

T. borealis Phil. was proposed for American specimens; Philippi's figures are copied on Pl. 39, figs. 49, 50. His figure of *T. margarita* Mont. on Pl. 39, fig. 63. *M. vulgaris* Leach (Pl. 39, fig. 46,) is the same as the form called *campanulata* by Morse.

M. grænlandica 'Beck' of Sowerby, in Reeve, f. 6, and of Philippi, Conchyl. Cab. t. 37, f. 5, are probably additional synonyms of this protean species. The figures of Sowerby and of Philippi are copied on Pl. 44, fig. 22, and 21.

M. ACUMINATA Sowerby. Pl. 39, fig. 55; pl. 66, fig. 6.

Shell orbicular, thin, whitish; spire acuminate, whorls 5, rounded, smooth; suture distinct; aperture orbicular; umbilicus small.

Alt. .55, diam. .5 in. (*Sowb.*)

Arctic Ocean.

M. acuminata Sowb., Mal. and Conch. Mag. i, p. 26 (1838).—Conch. Ill., f. 7.—Sowb. JR. in Reeve, Conch. Icon., f. 13.—*Trochus bembex* PHIL., Conchyl. Cab., p. 286, t. 42, f. 5.—*M. acuminata* MIGH. & AD., Bost. Journ. N. H. iv, p. 46, t. 4, f. 15.

The *M. acuminata* Mighels and Adams (pl. 66, fig. 6), taken in the Gulf of St. Lawrence, is described as follows:

Shell small, orbicular, subconical, thin, of a grayish-white or russet color, spire acuminate; whorls 4, well-rounded, smooth, covered with a thin semitransparent epidermis, striæ of growth very fine and compact; suture well impressed; aperture orbicular, considerably oblique, beautifully iridescent within; operculum horny, spiral. Alt $6\frac{1}{4}$, diam. $6\frac{1}{2}$ mill. (*M. & A.*)

The single specimen of this American form before me is much more depressed than the figure given by Sowerby. It seems to be specifically distinct.

M. VAHLII Möller. Pl. 39, figs. 58, 59.

Shell small, conoidal, very smooth, shining, hyaline, pearly; whorls 4-4½, convex, the last subangular; umbilicus narrow. (*Phil.*)

This is the smallest of the *Margarita* species known to me. The shell approaches a pretty flat cone in form, for the upper whorls are

only a little convex, and even the last are rather declivous. The umbilicus is narrow, not sharply bounded; the aperture circular, almost higher than broad, with simple, acute peristome. The entire shell is completely smooth, very shining, transparent, pearly-colored. The inside glitters with rainbow tints. Diam. 1-1½ lines. (*Phil.*)

Greenland; Spitzbergen; Plover Bay, Behring Sea.

Marg. vahlü MOLL., Ind. Moll. Grönl., p. 8.—*Tr. vahlü* Möll. PHIL., Conchyl. Cab., p. 286, t. 42, f. 6.—*M. vahlü* Möll., KRAUSE, Archiv. f. Naturg. 1885, p. 261.

M. UMBILICALIS Broderip & Sowerby. Pl. 39, figs. 61, 62, 64; pl. 64, figs. 39, 40, 41.

Widely, openly umbilicate, depressed-conical, thin, brownish-yellow; surface polished, shining, the inner whorls closely lirulate, the sculpture becoming obsolete on the last two whorls, which however usually show a few obsolete striae just above the periphery; the umbilicus has a few obscure striae within, or none; the spire is elevated, apex minute, subacute; sutures deeply impressed; whorls about 6, convex, the last rapidly increasing, very wide; aperture oblique, subcircular, nacreous inside; peristome simple, terminations converging, connected by a short parietal callous; umbilicus profound, funnel-shaped.

Alt. 11, diam. 15 mill.; alt. 13, diam. 22 mill.; alt. 15, diam. 21 mill.

Melville Id.; Cumberland Sound; Greenland.

Margarita umbilicalis BROD. AND SEY. Mal. and Conch. Mag. i, p. 26, 1838; Conch. Ill., f. 5.—SOWB. in Reeve, Conch. Icon. xx, Monog. Margarita, f. 1.—PHILIPPI, Conchyl. Cab., p. 245, t. 37, f. 2.—GEORG PFEFFER, in Naturhist. Mus. zu Hamburg, Dr. Pagenstecher's Bericht für 1885, p. 43, f. 1a, b, c (1886).

This well-marked form is characterized by its lirate upper 2 or 3 whorls, large size, and broadly conoid contour. The specimens before me have no more exact locality than "Greenland."

M. VORTICIFERA Dall. Pl. 59, figs. 48, 49, 50.

Shell depressed, with 3 flattened, rapidly expanding whorls, which have a tendency in old individuals to overhang the suture anterior to them; the upper surface is traversed by numerous slender slightly elevated revolving threads, which are crossed by faint lines of growth. Outer edge of whorls subcarinate. The basal surface is

less flattened, but similarly sculptured, except that the very wide and funnel-shaped umbilicus is destitute of revolving striae, and the lines of growth are here a little stronger. Aperture excessively oblique, with the anterior angle much produced; lips hardly thickened, and but slightly interrupted at the junction with the body-whorl. Nacre salmon-color; external surface pinkish-white, brilliantly pearly where eroded. Alt. .5, diam. .85 in. (*Dall.*)

Iliuliak Harbor, Captain's Bay, Unalashka; larger specimens in the Akutan Pass, 10-60 fms; Behring Sea.

M. vorticifera DALL, Proc. Cal. Acad. Sci. v, 1873, p. 59, t. 2, f. 4.—KRAUSE, Arch. f. Naturg. 1885, p. 260.

This form is closely allied to *M. umbilicalis* Brod. and Sowb.

M. ARGENTATA Gould. Pl. 64, figs. 48, 49.

Shell small, narrowly umbilicate, globose-depressed, conoidal, thin, subtransparent, corneous or bluish white in color; surface lusterless, dull, closely marked all over by fine, close-set spiral striae, scarcely visible except under a lens; spire conoidal, apex minute, blunt; whorls 4, tumid; suture deeply impressed; aperture circular, oblique, outer lip simple, acute, inner lip arcuate, a trifle reflexed; umbilicus narrow, deep.

Alt. $2\frac{3}{4}$, diam. 3 mill. (American specimens); alt. $3\frac{1}{2}$, diam. $3\cdot2$ mill. (European specimens.)

Massachusetts, England, Scandinavia and Northward; Behring Sea.

M. argentata GOULD, Invert. Mass., p. 256, f. 174 (1841).—edit. BINNEY, p. 282, f. 544.—*M. glauca* MOLLER Ind. Moll. Grœnl., p. 8 (1842).—*Trochus glaucus* Moll. JEFFREYS, Brit. Conch. v (suppl.), p. 202.—*Trochus argentatus* Gld., PHILIPPI, Conchyl. Cab., p. 285, t. 42, f. 4.—*Margarita olivacea* BROWN, KRAUSE, Arch. f. naturg. 1885, p. 261.—SARS, Moll. Reg. Arct. Norvegiæ, p. 134, t. 9, f. 6.—*Trochus olivaceus* BROWN, 1827, JEFFREYS, in Ann. & Mag. N. H. 1877, p. 2, 40.—*Margarita harrisoni*? HANCOCK, Ann. & Mag. N. H. 1846, p. 325.—*M. argentata* Gld. var. *gigantea* LECHE, Kongl. Sv. Vet., Akad. Handl. Stockholm, p. 43, t. 1, f. 11.

I do not know where this shell was described by Brown; Sars gives no reference nor does Jeffreys. It is easily recognized by the lusterless closely spirally striate surface and small size. Philippi's figures, copied on my pl. 39, figs. 47, 48, are incorrect in showing no spiral striae. The var. *gigantea* of Leche, described from Nova Zembla differs in its large size. Alt. 10-10½, diam. 10-11 mill.

M. FRIELEI Krause. Pl. 66, figs. 91, 92.

Shell thin, white, pearly within, depressed-conical; spire obtuse; whorls 4, regularly rounded, the last much dilated; suture deeply impressed; aperture rounded, outer and inner lips equally arcuate; umbilicus broad, not definitely bounded, but rounding into the base; surface covered with very fine undulating spiral striæ.

Alt. 6, diam. 10 mill.

Radula elongated, rhachidian teeth with greatly recurved apices, finely denticulated, laterals narrow-falciform, uncini large, sigmoid.

Formula 17-(1)-9-(1)-17. (*Krause*.)

St. Lawrence Bay, Behring Sea.

M. Frielei KRAUSE, Archiv f. Naturgeschichte, 1885, p. 263, t. 16, f. 2 (shell and radula).

The shell is very similar to that of *M. argentata* Gld., but the characters of the radula are much more like that of *Solariella*. The animal is colorless; it has 5 epipodial cirrhi on each side, and small frontal lappets.

M. UNDULATA Sowerby. Pl. 39, figs. 36-39; pl. 64, figs. 42, 43, 44.

Shell umbilicate, conical, thin but rather solid, lusterless, varying from a dark flesh tint to yellowish in color; surface covered with fine sharply-cut spiral riblets, irregular in size, generally alternating larger and smaller, about 10-12 in number on the penultimate whorl in large specimens, much less prominent on the base except around the umbilicus. Below the suture there is a series of little folds or puckerings, more or less obvious on different individuals. The spire is conical, elevated, the apex minute, acute; sutures well impressed; whorls 6, convex, the last very obtusely subangular at the periphery, rather flattened beneath; aperture very oblique, nearly round; margins simple, converging, joined by a short parietal callous; umbilicus deep, rather funnel-shaped, its margin not distinctly angular. Alt. 8-9, diam. 10 mill.

New England, England, Scandinavia, north to Greenland.

Margarita undulata Sowb. Mal. and Conch. Mag. i, p. 26, 1838; Conch. Illust., f. 4.—GOULD, Invert. Mass., p. 254, f. 172.—REEVE, Conch. Syst., t. 221, f. 4.—Sowb. in Reeve, Conch. Icon., f. 2; GOULD, edit. Binney, Inv. Mass., p. 280, f. 541.—*Trochus undulatus* PHILIPPI Conchyl. Cab., p. 251, t. 37, f. 13, 14.—FORBES & HANLEY Hist. Brit. Moll., ii, p. 528, t. 68, f. 1, 2; t. 73, f. 5, 6.—*Turbo incarnatus* Couthouy, Bost. Journ. N. H. ii, p. 98, t. 3, f. 13.—*Mar-*

garita striata LEACH in Appendix to Ross's Voyage to North Pole (inadequately defined, but from types, *teste* Forbes & Hanley).—GRAY, Zool. Journ. ii, p. 567.—*Turbo carneus* LOWE, Zool. Journ. ii, p. 107, t. 5, f. 12, 13; Brit. Mar. Conch., p. 170.—*Margarita carnea* SOWB. Mal. and Conch. Mag., p. 25; Conch., Illust. f. 9.—BROWN, Conch. G. Brit., p. 17, t. 10, f. 36, 37.—*Trochus grönlandicus umbilicatus, etc.*, CHEMNITZ, Conchylien Cab., v, p. 108, t. 171, f. 1671 (1781), (*not binomial*).—*T. grönlandicus* Chem. JEFFREYS, Brit. Conch. iii, p. 298, t. 61, f. 5.—(*not T. grönlandicus* Chem. PHILIPPI, Conchyl. Cab., p. 247, t. 37, f. 5, a form probably equaling *M. helicina* or *M. umbilicalis*).—*Margarita grönlandica* SARS, Moll. Reg. Arct. Norvegiæ, p. 133, t. iii, f. 9 (Dentition).—*M. sulcata* SOWB. Mal. and Conch. Mag. i, p. 26; Conch. Illust., f. 1.—SOWB. in Reeve, Conch. Icon., f. 3.—*Trochus rossii*, PHIL., Conchyl. Cab., p. 288, t. 42, f. 9.—*M. grænlandica* Chemn. LECHE, Kongl. Sw. Vetensk. Akademiens Handlingar, xvi, p. 40, 1878, and vars. *rudis*, *lævigata* Mörch, *intermedia* nov. (Nova Zembla).—*M. undulata* Sowb. MIDDENDORFF, Mal. Rossica, ii, p. 72.—*T. cinerareus* O. FAB. Fauna Grœnl., p. 392.—*T. fabricii* Phil., Conchyl. Cab., p. 284, t. 42, f. 2.

The spiral riblets are much finer and more numerous than in *M. cinerea*. Jeffreys describes var. *albida*, shell whitish; var. *dilatata*, more depressed and expanded at the sides, encircled on the upper part by only a few spiral striæ or impressed lines; var. *lævior* smaller, more conical, solid and glossy, quite smooth with the exception of one or two slight spiral ribs on the uppermost whorls, flesh color. The *M. undulata* is a common species in collections; I have seen numerous specimens of the form nearly smooth beneath. The subsutural folds are often obsolete or nearly so. Sowerby's *M. sulcata* is figured on pl. 39, fig. 60. Philippi's poor figures of *T. rossii* (= *sulcata* Sowb. *teste* Phil.!) are given on pl. 39, figs. 40, 41.

The *T. cinerareus* Fab., *fabricii* Phil., is figured on Pl. 39, figs. 53, 54. It is probably a variety.

M. CINEREA Couthouy. Pl. 44, figs. 20; pl. 60, fig. 29; pl. 44, fig. 25; pl. 37, fig. 5.

Shell umbilicate, conical, thin, cinereous or brownish colored; surface lusterless, finely, sharply densely obliquely striate, spirally liræ; the liræ are coarse and unequal, 2 to 4 being more prominent on the upper surface, those on the base are decidedly smaller, closer,

more regular and equal, 8 to 12 in number; base radiately densely striate; upper part of the whorls often with small ill-defined folds. Spire elevated; apex minute, rather obtuse; upper three whorls strongly carinate; antepenultimate generally bicarinate; last whorl subangular at the circumference, flattened, only slightly convex on the base; aperture subcircular, slightly subangular above and at base of the columella, oblique, lined with silvery iridescent nacre; outer lip simple, columellar lip a little straightened in the middle, forming an obtuse angle at its junction with the basal lip; umbilicus marked only by growth-lines within, bounded by an angle.

Alt. 11, diam. 10 mill.

Massachusetts, Hebrides, Norway northward; Behring Sea.

Margarita striata BROD. & SOWB. in Zool. Journ. iv, 1829, p. 371.—SOWERBY, Mal. and Conch. Mag. i, p. 25; Conch. Ill., f. 3, 18.—MIDDENDORFF, Mal. Rossica ii, p. 74.—SOWB. in Reeve, Conch. Icon., f. 7 (Not *M. striata* Leach).—*M. maxima* SOWB., l. c., f. 24.—*Turbo cinereus* COUTHOUY, Journ. Bost. Soc. N. H. ii, p. 99, t. 3, f. 9 (1838'39).—*M. cinerea* GOULD, Invert. of Mass., p. 252; BINNEY's ed., p. 279, fig. 539.—DEKAY, N. Y. Moll., p. 108, t. 6, f. 113.—SARS, Moll. Reg. Arct. Norv., p. 134, t. 9, f. 1; t. 21, f. 4, 5; t. iii, f. 11 (Dentition).—*Tr. cinereus* Couth. JEFF., Brit. Conch. v (suppl.), p. 202.—LECHE, Kongl. Sven. Vet. Akademiens Handl., xvi, p. 42 (Nova Zembla!).—(not *Tr. cinereus* DA COSTA, Brit. Conch., p. 42, t. 3, f. 9, 10, and of some other English authors, a species synonymous with the West Indian *Tr. (Omphalius) excavatus* Lam.).—*M. sordida* HANCOCK, Ann. & Mag. N. H. 1846, xviii, p. 324.—*Trochus polaris* PHIL., Conchyl. Cab., p. 249, t. 37, f. 9.—*Turbo corneus* KIENER, Species et Icon. genre *Turbo*, t. 19, f. 2.—*Trochus corneus* FISCHER, Coq. Vivantes, p. 70, t. 19, f. 2 (genre *Turbo*).—*Margarita cornea* SOWERBY in Reeve, Conch. Icon., f. 21.—*T. (Margarita) beecheyanus* VON MARTENS, Mal. Blätter, xix, p. 89, t. 3, f. 1, 2.—*M. striata* Brod. & Sby. FRIELE, Norwegian North Atlantic Expedition, Moll., ii, p. 31, and var. *margaritifera* FRIELE, l. c., p. 32, t. 12, f. 2, 3.

A variable species. The dense fine striation, coarse spiral liration of the upper surface and more finely, regularly lirate base are the more obvious characters. In some specimens the basal liræ are almost obsolete except around the umbilicus; figs. 27, 28, pl. 60,

represent very young shells; fig. 29, pl. 60 is the var. *grandis* of Mörch; fig. 25, pl. 44, is the *M. maxima* of Sowerby; fig. 20, pl. 44 is copied from the original figure of *T. corneus* Kiener. The typical form is figured on pl. 64, figs. 53, 54. The *T. BEECHLEYANUS* Martens is figured on pl. 44, figs. 26, 27. I am unable to find characters separating it from *cinerea*.

Var. MARGARITIFERA Friele. Pl. 66, fig. 100, 1.

The shell broad coniform, rather thin, with a strong mother-of-pearl luster; 5 whorls, connected by a shallow suture. The sculpture consists of 4 to 5 angular spiral ribs on the ultimate whorl, and 2 to 3 on the spire whorls; apex smooth; on the lower surface of the shell, which is rather flattened, close spiral striae occur; the shell otherwise is smooth, except that toward the aperture there are some faint lines of growth; umbilicus narrow. Alt. $5\frac{1}{2}$, diam. $5\frac{1}{2}$ mill.

This is the most beautiful shell found in the Arctic Ocean. It has a luster equal to the most brilliant pearl. The umbilicus is strikingly narrower than in the typical form. (*Friele*).

Arctic Ocean, East of Greenland, 350 fms.

M. SCHANTARICA Middendorff. Pl. 47, figs. 84-88.

Shell perforate, conoid-convex, apex obtuse, thin, dark slate-gray, buff around the umbilicus, with spots of dull black below the periphery; whorls convex, encircled by striae; last whorl large, scarcely angulated, base a little convex, suture distinct; aperture large, suborbicular, peristome subcontinuous; columella subproduced at base; umbilicus partly closed by the columellar lip.

Alt. 21, diam. 22 mill.; alt. 21, diam. 19 mill. (*Midd.*).

Schantar Is., Sea of Ockhotsk.

Trochus schantaricus MIDD., Mém. de l'Acad. de St. Pétersb. vi, ser., viii, p. 413; Reise in Sibiriens, ii, Zoologie, p. 204, t. 18, f. 1-7 (1851); Beitr. zu Mal. Rossica, ii, p. 85 (1847).—*T. modestus* MIDD., Beitr. zu einer Mal. Rossica, ii, p. 85, t. 10, f. 16-18 (1847).—*Margarita modesta* Midd. SOWB., Conch. Icon., f. 23.

The line-like, elevated longitudinal striae of the sculpture are only weak, but are pretty sharply defined. They encircle the whorls at regular distances from each other, and are about one-fourth the

width of their intersices. Sometimes there are still more delicate secondary threads between them. Of the first I count 10-12 on the penultimate whorl. Upon the base of the last whorl the ridges become broader and broader. In the vicinity of the umbilicus they exceed double the breadth of the intervening furrows. The layer which this sculpture principally composes, is for the rest only about the thickness of a coat of varnish; and beneath it, showing very slight traces of longitudinal striæ, appears silvery mother-of-pearl, which shines on the whorls of many specimens while still living. The most usual color is a dark slate-gray, through which the pearly layer, as through a heavy gauze, faintly shines. But if one still closer follows the color-changes, we find upon the pearly layer a thick yellow one, visible also from outside on the base, for it extends over the whole umbilical tract as far as the inner lip. Usually this yellow tract merges into the ground color around its circumference; more seldom it is sharply defined. In some specimens this yellow color predominates over the whole shell. But usually it is covered by the slate-color, which on the base through separated flames passes into the above-described yellow umbilical spot. (*Midd.*)

The *T. modestus* of Midd., seems to me to be very closely allied, perhaps only a variety. The name is preoccupied by Philippi. The description, translated in full, is as follows:

T. modestus Midd. (pl. 47, figs. 89-91). Shell conoidal, apex acute, reddish-brown, encircled by elevated lurid lines; when decorated the stratum beneath is pearly, azure. Whorls little convex, encircled by sharply cut longitudinal [spiral] striæ; last whorl subangulate, base convexo-plane, concentrically striate; aperture suborbicular, pearly, white; umbilicus closed.

Alt. 15, diam. 14 mill. (*Midd.*).

The elevated sculpture striæ which encircle the whorls, are very clearly cut on the entire spire, double as narrow as the intervening furrows; 6-7 are upon the penultimate, 5 on the antepenultimate, and 4 on the next earlier whorl; 10 striæ encircle the last whorl above, and as many upon the base; the innermost of the latter extend to the columella, and a few of them are also visible within the aperture. The intersices between the striæ are brown-red, and sometimes have a trace of a secondary thread. The elevated striæ

themselves are brownish-yellow, when the very thin layer of colored calcareous matter is eroded, a beautiful azure-blue nacre is revealed.

Sitka.

This species I have not seen. It may belong near *Gibbula fulgens* Gld., perhaps.

I do not know whether Sowerby had the true *modestus* of Midd., or not. His figure is copied on pl., 37, fig. 8. His monograph of *Margarita* in Reeve's *Iconica* contains more blunders than any work I have ever seen, unless some other papers by the same author prove to be exceptions.

M. PUPILLA Gould. Pl. 44, figs. 29-32.

Shell narrowly umbilicated, conical, solid, lusterless, ashen or whitish; surface spirally traversed by unequal cord-like liræ, separated by sharply crispate-striate interspaces, as wide or wider than the ridges. The latter are nearly smooth or show traces of the oblique striation; upon the last $1\frac{1}{2}$ whorls there is usually a spiral thread in the inter-liral spaces; above this there are 4 or 5 liræ on each whorl. Upon the base the concentric riblets decrease regularly in size from the center outward, and number about 12. The spire is elevated; apex subacute; sutures impressed; whorls 6, convex, the last obtusely angled, flattened beneath; aperture very oblique, rounded, iridescent inside; peristome simple, columella arcuate, subreflexed at the umbilicus, often nearly closing it, united with the upper termination of the lip by a parietal callous; umbilicus bounded by a carina, funnel-shaped, its perforation very small.

Alt. 13, diam. 12 mill.

Alaska to Monterey, Cal.

Trochus pupillus GOULD, Proc. Bost. Soc. N. H. iii, p. 91 (1850).—U. S. Expl. Exped., Moll. and Shells, p. 186, atlas, f. 208 (not *Cantharidus pupillus* 'Gld.' HUTTON, Proc. Linn. Soc. N. S. W. ix, p. 362, and other places).—*Margarita pupilla* of CARPENTER and American authors generally.—DALL, Am. Journ. Conch. vii, p. 127.—*M. calostoma* A. AD., P. Z. S. 1851, p. 190.—*M. inflata* CARPENTER, Proc. Acad. N. S. Phila. 1865, p. 62.—*M. salmonea* CARPENTER, Proc. Cal. Acad. N. Sci. iii, p. 158 (1864).

A very variable shell. Southward the color becomes deeper, of a salmon hue, and the sculpture finer. Compare *Tr. modestus* Midd., and *Tr. beechyanus* von Martens.

M. (?) *NUDIUSCULA* Martens. *Unfigured.*

Shell perforated, conical, bicarinate, pearly; whorls $4\frac{1}{2}$, gradate, the first 2 yellowish, smooth, the following ones denuded-pearly, beneath the suture sculptured with a series of nodules and smooth spiral liræ, few in number or evanescent; last whorl with elevated concentric lines on the base, stronger on the periphery, and radiating impressed lines. Aperture rhomboid-rounded; columellar margin concave, thickened, below a little expanded, edentulous.

Alt. 4, diam. $4\frac{1}{2}$ mill.; apert., alt. 2, diam. $2\frac{1}{2}$ mill. (*Martens.*)

East Coast of Patagonia, 43° S. lat.; 60 fms. depth.

Trochus (Margarita) nudiusculus, MARTENS, in Sitzungsberichte Ges. Naturforsch. Freunde, Berlin, 1881, p. 77.

Reminds one most of *Tr. nudus* Phil., but is different in the sculpture and the open, though very narrow, umbilicus. (*Martens.*)

M. *CANFIELDI* Dall.

Shell of seven whorls, the last whorl comprising more than half the shell. Above, sutures small but deeply channelled; whorls smooth, with three revolving ribs close to the suture, also three or four on the lower part of the whorl. Color pearly, with bronze-yellow pencilings obliquely to the suture. Surface of the whorls rather flattened, semicarinated, convex. Shell umbilicated with nine basal revolving ribs. Umbilicus strongly carinate internally, smooth, narrow and small. Aperture rhomboidal, pearly, with grooves answering to the exterior ribs. Columella straight, with a slight callosity, but not reflected. (*Dall.*) Alt. .4; min. diam. .3, maj. diam. .4 in.

Monterey, California.

Gibbula canfieldi DALL, Am. Journ. Conch. vii, p. 129, 1871.
(? *Calliostoma Canfieldi* Dall, MSS., 1866.)

I have not seen this form.

M. *LIRULATA* Carpenter. Pl. 65, figs. 81, 82, 87.

Shell umbilicate, globose-conical, solid, lusterless or slightly shining, purplish, unicolorous, or with large radiating white patches above, or around the periphery, or spiral darker lines, or spiral articulated lines. Surface either with (1st) a few (2-4) strong liræ above, their interspaces smooth, the base with about 8 concentric lirule, or (2d) more numerous narrow irregular lirulæ above, those of

the base still smaller, or (3d) the spiral sculpture obsolete, surface smooth or nearly so above and beneath. The spire is more or less elevated; apex obtuse; suture impressed, sometimes subcanaliculate; body-whorl convex beneath; aperture oblique, oval-rhomboidal, very brilliantly iridescent within, but the acute peristome has a rather broad marginal band of opaque white; columella simple; umbilicus tubular, with incremental striae within. Alt. 4-5, diam. 4-5 mill.

Sitka to San Diego, Cal.

M. lirulata CARP. (and vars. *subelevata*, *obsoleta* and *conica*) Proc. A. N. S. Phil. 1865, p. 61; Suppl. Rep. Brit. Asso. 1864, p. 653.—*M. var. tenuisculpta* CARP. Proc. A. N. S. Phil. 1865, p. 61.—*M. acuticostata* CARP. Proc. Cal. Acad. 1864, iii, p. 157.—*Gibbula optabilis* CPR. Proc. Cal. Acad. iii, p. 214.—*Gibbula parapieta* CPR., Ann. and Mag. N. H. 1864, p. 426.—*G. succincta*, *G. funiculata* and *G. lacunata* CARP., *l. c.*, p. 426, 427.—*M. lirulata* (Carp.) DALL, Amer. Journ. Conch. vii, p. 128.

"After a careful study of the types of the above species, and a comparison of hundreds of specimens collected by Mr. Stearns and myself at Monterey and elsewhere, I am compelled to the belief that they are simply forms of one protean species. They are not even varieties capable of diagnosis; for not only are the intermediate specimens as abundant as the nominal species, but the characters, singly, are interchanged without limitation." (*Dall.*)

The above synonymy is adopted from Dr. Dall. The species, while in the highest degree variable, is easily known from other West American Trochidæ.

M. FULGIDA Jeffreys. Pl. 47, fig. 99.

Shell globose-conical, rather thin, transparent, and of a bright luster; sculpture, only some very fine and scratch-like spiral striae round the base; color clear white; spire raised; whorls 4, convex, somewhat flattened below the suture; the last occupies four-fifths of the shell; apex depressed and regularly spiral; suture rather deep; mouth circular, incurved above; the peristome is not continuous or complete, but similar to that of other species in the present genus; umbilicus narrow and deep; operculum filmy, multispiral, with obscure lines to distinguish the whorls.

Alt. '1, diam. .085 in. (*Jeffreys.*)

N. Atlantic, lat. 48° 6', long. W. 9° 8'. 539 fms.

T. fulgidus JEFFR. P. Z. S. 1883, p. 95, t. 20, f. 1.

M. MINUTULA Jeffreys. Pl. 47, figs. 4, 5.

Shell pyramidal, rather solid for its minute size, opaque and polished; sculpture none; color white with a yellowish tinge; spire raised; whorls 6, moderately convex but compressed, regularly enlarging; the last is slightly keeled on the periphery and occupies about two-fifths of the shell; apex blunt; suture distinct and rather deep; mouth representing an arc of two-thirds of a circle, incurved just below the periphery, and somewhat expanded below; umbilicus sunken, with a small and deep perforation in the middle.

Alt. .0625, diam. .05 in. (*Jeffreys.*)

N. Atlantic.

T. minutulus JEFFR. P. Z. S. 1883, p. 95, t. 20, f. 2.—*M. minima* Seguenza (MS.) teste JEFFR. l. c.

Has been found fossil in the pliocene at Messina.

M. LAMINARUM Jeffreys. Pl. 47, figs. 6, 7.

Shell conical, rather thin, semitransparent and lusterless; sculpture, numerous thin and delicate but jagged and irregular curved laminae in the line of growth, which do not extend to the umbilicus; there are about 40 on the last whorl, some of them double; the interstices are quite smooth; color light yellowish-brown; spire raised; whorls 6, convex and rounded; the last is equal to about two-fifths of the spire; apex twisted; suture distinct; mouth nearly circular; outer lip thin, but thicker and expanding at the base and partly folded over the umbilical perforation; umbilicus somewhat concave, with a small perforation. Alt. .15, diam. .1 in. (*Jeffrey.*)

Off Cape Mondego, 795–994 fms.

T. laminarum JEFF., P. Z. S. 1883, p. 95, t. 20, f. 3.

M. CANCELLATA Jeffreys. Pl. 47, fig. 8.

Shell forming a depressed cone, rather thin, opaque and lusterless; sculpture, oblique laminar ribs in the line of growth which are crossed by as many but slighter spiral striae; there are about 20 ribs and striae on the last whorl; this sculpture covers the base, but the striae are wanting on the apex; color pale yellowish-brown; spire rather depressed; whorls 5–6, convex; the last occupies three-fifths of the shell; apex regular and compressed; mouth more round than oval, angulated above and below on the inner side; outer lip somewhat expanded and thickened; inner lip nearly straight, attached to

the pillar below the periphery; umbilicus rather narrow, with a deep perforation which exposes the inner whorls.

Alt. .1, diam. .15 in. (*Jeff.*)

Josephine Bank, 340-430 fms.

T. cancellatus JEFF., P. Z. S. 1883, p. 96, t. 20, f. 4.

Dall has expressed the opinion that this species is a *Cyclostrema* or *Adeorbis*.

M. BRYCHIIUS Watson. Pl. 64, fig. 50.

Shell globosely depressed, with a small high spire, very thin, rather opaque, rough, dull, and slightly iridescent. Sculpture: The whole surface looks as if a rough epidermis were gathered into close, minute, obliquely longitudinal puckerings, with stronger folds about 0.003 in. broad and 0.005 in. apart. These folds tend on the last whorl to disappear, except near the suture and toward the umbilicus. They are crossed by fourteen to sixteen fine round spiral threads, which at the crossing of each fold rise into knots. On the upper surface of the body-whorl they become very faint; there are four on the penultimate whorl, the first being remote from the upper suture, the last close to the lower suture. Besides these, the surface is microscopically wrinkled spirally. Color a dead slightly grayish-white, which, toward the mouth, especially when wet, is faintly shot with a green and pink iridescence. Spire rather high, the earlier whorls being small and very much twisted out, so as to rise above one another by almost their entire height. The apex is round and blunt, and terminates abruptly, but all the earlier whorls have lost their outer layer. Whorls 5, very round, of very regular but rather rapid increase. Suture deeply and sharply impressed. Mouth rather oblique round, not descending brilliantly iridescent within. Outer lip thin, turning down to meet the pillar-lip and carried across the short junction with the body by a thin nacreous callus, which is continued within, and is, in fact, the completion of the whorl into a tube. Inner lip slightly thickened, curved, just barely reflected. Umbilicus wide and pervious, exposing all the whorls, and strongly cross-hatched within by the spiral and longitudinal threads. Operculum very thin, clear, and bright, with about eight faintly-defined turns, and marked with microscopic concentric lines.

Alt. .64 in. diam. .87, lesser, .62 in. Penultimate whorl, 0.8.1 Mouth, height 0.43, breadth 0.4 in. (*Watson.*)

This shell slightly recalls *Helix ericetorum*, Müll. but much more closely resembles some of the West Indian land-operculates, such as *Aulopoma*. With its semi-continuous peristome it very much recalls a *Cyclostrema*, all the more so that it is less pearly within, less nacreous and more chalky, and less globosely conoidal than *Margaritas* usually are; but I have no doubt that it is a *Margarita*. *Trochus* (*Margarita*) *umbilicalis*, Brod. and Sow., is vaguely like, but is very obviously different; the apex is not so exerted as here, the whorls are of much more rapid increase, and form a much larger though lower spire; the last whorl is proportionally much more tumid and above is more flattened, the suture is much more oblique, the umbilicus is very much smaller and more covered by the inner lip, and the hard, polished, buff-colored porcelaneous outer layer of the shell (which is very like that in *Trochus* (*Margarita*) *expansus*, Sow.) is very unlike. (*Watson*.)

About 900 miles S. E. of Kerguelen, 1260 fms.

T. (Margarita) brychius WATSON, Journ. Linn. Soc. Lond. xiv, p. 699; Challenger Gasterop., p. 77, t. 5, f. 7.

M. CHAROPUS Watson. Pl. 64, figs. 55, 56.

Shell globosely conical, like a *Cyclophorus*, thin, translucent, umbilicated, iridescent, banded. Sculpture: Of spiral threads there are from twenty-five to thirty-five, sharply projecting, rounded, and fine on the last whorl; of these, from three to seven are feebler than the rest; those on the base are continued within the mouth. The interstices are much broader than the threads. The whole surface is also fretted by microscopic spirals and stronger longitudinals, which follow the oblique lines of growth. Of the threads, six to thirteen appear on the penultimate whorl; they begin with the second whorl, and there the longitudinals are rather disproportionately strong and regular. The embryonic apex is faintly but coarsely tubercled. Color yellowish white, shot on the upper side with a dark iridescence; the spirals are black, clouded, and broken with oblique longitudinal streaks of white. The spire is high and scalar. The apex, porcelaneous and scarcely iridescent, is small, high, and mammillate, and consists of the one embryonic whorl, which is a little turned up on its side. Whorls 6, of gradual and regular increase, rounded, near the apex a little angulated by one

of the spirals. Suture well marked, angulated, but not sharply so. Mouth rather oblique, rounded, hardly angulated at the upper corner, not in the least descending, brilliantly iridescent within and showing the colored spirals of the outside. Outer lip thin, slightly puckered at the spirals, a little thickened on the base. Inner lip thickened and reflected, especially at its junction with the body where it almost covers the umbilicus. The pillar is much curved, and thins gradually out to its junction with the base. The umbilicus is large and funnel-shaped on the base, deep, but small further in, contracted by a spiral white pillar-pad, and more than half covered over by the pillar-lip. Operculum rather thin, horny, yellow, with ten or twelve very gradual turns, which are strongly defined by a thickened line; it is feebly marked with concentric and with radiating lines.

Alt. 0.77 in., diam. 0.78, least 0.66. Penultimate whorl, 0.2. Mouth, height 0.4, breadth 0.4. . (*Watson.*)

There is a *Margarita striata*, Leach (*nec* Linn. *nec* Brod.) which this resembles, but the Kerguelen species is very much more flattened and broader, and much more contracted in the spire.

The variety *cæruleus* (fig. 55) differs from the type in having only four spiral threads above the periphery, while on the base below the peripheral thread the threads are also fewer, and are flattened out till they are barely parted by narrow lines of iridescent white. With the exception of these and the white umbilicus, the base is of an intense blue-black gray. The comparative absence of the spirals on the upper part of the whorls gives a flatness to the aspect of the shell below the suture, while the strength of the second and fourth spirals gives an angulation to the whorls that is apt to mislead the eye, the more so that the only specimen of this variety has the whole spire completely covered with Polyzoa. In spite, however, of its deceptive appearance, I am persuaded that this is only a variety of *Trochus charopus*, the more so that the marking on the embryonic whorl are identical.

In form this variety especially recalls *Margarita polaris*, Beck (Geneva Mus. Coll. Delessert), as also in its distant rather sharp spirals and half covered umbilicus, but it is more depressed on the base and flattened below the suture; the whorls are of much more

rapid increase, the spirals on the base are very much more numerous, and the shell is brilliant in polish and in color. (*Watson.*)

Kerguelen Id.; off Cumberland Bay, 105 fms.

T. (Margarita) charopus WATSON, Jour. Linn. Soc. Lond. xiv, p. 700; Challenger Gasterop., p. 78, t. 5, f. 6. Var: *cæruleus*, *l. c.*

M. POMPHOLUGOTUS Watson. Pl. 64, figs. 59.

Shell depressedly globose, with a low turreted spire, thin, opaque, chalky, rough, umbilicate. Sculpture: There are of spirals on the last whorl about forty, low, rounded, very unequal, some being very minute, one or two above the periphery stronger than the rest; the lowest of all is much the strongest, and defines the umbilicus within which the whole sculpture increases in distinctness; on the penultimate whorl there are about twelve spirals fully stronger than on the last. The furrows are broader than the threads, but as they widen are occupied by a minute intermediate thread. Longitudinally these spirals and furrows are crossed by much finer and sharper oblique threads, which in general are much narrower than their interstices; but towards the mouth, where all the sculpture becomes feebler, these threads become extremely numerous and crowded. Color yellowish-chalky-white over brilliant naere. Spire not much elevated, but a little scalar, apex eroded. Whorls 5, rounded, of rapid increase, inflated on the base. Suture impressed near the apex, while towards the mouth it becomes filled up, and is finely margined, by the last whorl lapping up rather coarsely on the previous one. Mouth oblique, a little higher than it is broad, slightly flattened above, and a very little angulated at the insertion of the outer lip. Lip thin, a very little reflected on the umbilicus, porcelainous on the edge, with a very slight pearly marginal callus, which is continuous across the body and nacreous within. Umbilicus large, funnel-shaped, quickly contracting, but leaving the whole inner spire visible.

Alt. 0.38 in. diam. 0.4, least 0.33. Penultimate whorl, 0.1. Mouth, height 0.23, breadth 0.2. (*Watson.*)

Both in form and texture this species is extraordinarily like a depressed *Cyclostoma*. I have given it its name, in the absence of marked features, from its slight resemblance to a bubble. It has some resemblance to *Trochus rhina* Wats., when, as sometimes in that species, the sculpture is exceptionally obsolete; but the sculpt-

ure is still very obviously different, and the form is globose, not, as in that species, high and conical. (*Watson.*)

North of Culebra Id., W. Indies, 390 fms.

Tr. (Margarita) pompholugotus WATSON, Journ. Linn. Soc. xiv, p. 702; Challenger Gasterop., p. 79, t. 5, f. 9.

M. ILLOTUS Watson. Pl. 64, figs. 63, 64.

Shell conical, with a tumid base, a scalar spire, and an impressed suture, uncarinated, umbilicated, sharply spiralled, thin, brilliantly nacreous, but with a squalid and dirty surface. Sculpture: Longitudinals—there are dense lines of growth and remote puckerings of the surface which might be called bars if they were continuous, but except within the umbilicus they are not uniformly so; they follow the lines of growth, and are thus very oblique; they are stronger above than below the periphery. Spirals—much more marked than the longitudinals are the equal and regularly parted sharp spiral threads which score the whole surface. Of these there are two or three on the earlier whorls and four on all the later; where they are crossed by the longitudinal puckerings, they rise into small delicate round white tubercles, which are sparse on the subsutural, and denser on the peripheral threads; the four spiral threads on the base are feebly dotted, but the two which lie near the umbilicus are somewhat more strongly tubercled than any of the rest; there are none within the umbilicus. Color white; a thin calcareous layer covers the brilliant nacre of the shell but is obscured by a dirty deposit which simulates an epidermis. Spire high and scalar. Apex broken. Whorls $6\frac{1}{2}$ remaining, of rapid but regular increase, rounded, with a short sloping shoulder above, and constricted below; very tumid on the base, suture distinct and impressed by the constriction of the whorl above it. Mouth very perpendicular, roundly and gibbously oval, bluntly angulated at the insertion of the outer lip, and at the point of the pillar in front, dully nacreous within. Outer lip thin, not descending, well arched. Pillar-lip with a direct edge, concave, bending a good deal over the umbilicus; it joins the basal lip at an angle just where the spiral thread on the edge of the umbilicus occurs. Umbilicus funnel-shaped and pervious, but a good deal contracted by the convexity of the pillar; internally it is scored by longitudinal threadlets, and the strongly impressed suture coils around it within. Alt. 0.62 in. diam. 0.57. Penultimate whorl height 0.14. Mouth, height 0.31, breadth 0.26. (*Watson.*)

I am haunted with the impression of having somewhere seen this species, but can come on no more definite remembrance of it. It is connected with the *Trochus otto*i, Phil., group, and is not remote from *Trochus* (*Margarita*) *infundibulum* W., but is quite certainly distinct.

It may be observed that I have put a mark of interrogation to the station whence this species comes. The solitary specimen had been sent to Mr. Henderson that he might deal with the *Pagurus* it contained. Mr. Henderson in handing it to me, expressed some doubt of the accuracy of the station marking, as the *Pagurus* living in the shell was a North Atlantic species. The *Trochus* itself also suggests to me that locality rather than the shallow water of a South Pacific locality like station 304. (*Watson*.)

North-west Patagonia, 45 fms.

T. (Margarita) illotus WATSON, Challenger Rept., Gasterop., p. 86, t. 17, f. 3.

M. STREPTOPHORUS Watson. Pl. 64, figs. 65, 66.

Shell ivory white, thin, conical, rounded at the periphery, umbilicated, sculptured, and rough on the upper whorl. Sculpture: The upper whorls are dull, rough, reticulated, being crossed by oblique close-set riblets, scored by 7 or 8 fine round threads; the riblets gradually degenerate into puckerings, which die out in the course of the penultimate whorl; a necklace of little tubercles near the top of the puckerings becomes on this whorl double or treble, the tubercles being at the same time horizontally elongated; in this whorl too a very obtuse feeble tubercled carination appears in the middle of the whorls; both this keel and the subsutural necklace die out toward the mouth; the edge of the umbilicus is angularly keeled; outside of the keel is a strongish, but depressed thread; besides this stronger sculpture the whole surface is scored with very fine lines of growth and still more microscopic spiral scratches. Color white, dead above, and with the gloss and beauty of ivory below, where a faint pearly nacre gleams through. Spire somewhat raised, scalar. Apex small mammillated, but prominent. Whorls $6\frac{1}{2}$, high and convex, more or less angulated above the periphery, of regular but rapid increase; the last large, with a round but slightly flattened base, and with a large marginated funnel-shaped umbilicus, within which the lines of growth are very strong. Suture strong marginated. Mouth largish, round. Outer lip thin beveled off from the inside to a sharp edge, nacreous

within. Inner lip strong, concave, patulous, thickened and angulated at point of the pillar where the umbilical keel joins it. Umbilicus funnel-shaped, pervious; a deeply marked suture coils up within it.

Alt. 0.46 in., diam. 0.46. Penultimate whorl, height 0.14. Mouth, height 0.25, breadth 0.23 in. (*Watson.*)

This is a singularly beautiful shell. It is connected in a general way with the group to which *Trochus* (*Oxystele*) *euspira*, Dall. (Proc. Zool. Soc. Lond., 1883, p. 98, pl. xx, fig. 6) belongs. In that species the umbilicus is large when the shell is young, and fills up entirely when the shell is full grown. (*Watson.*)

S. E. of Philippines, 500 fms.

T. (Margarita) streptophorus WATSON, Challenger Gasterop., p. 91, t. 17, f. 4.

M. SCINTILLANS Watson. Pl. 64, fig. 62.

Shell small, thin, white, very depressedly conoidal, angulated, tumid on the base, umbilicated; mouth semioval. Sculpture: It is perfectly smooth but for some curved puckerings which radiate from the umbilicus, but very soon die out; above the middle the body-whorl is roundly angulated. Color pure white, with a transparent calcareous layer over brilliant fiery pearly nacre. Spire very depressedly conical. Apex bluntly rounded, with a minute hyaline, depressed embryonic tip. Whorls 4½ barely convex. Suture slightly impressed. Mouth semi-oval. Outer lip thin, barely angulated at the periphery. Pillar-lip straight, patulous, right-angled at its junction with the base. Umbilicus small.

Alt. 0.14 in., diam. 0.2, least 0.16. Penultimate whorl 0.025. Mouth, height 0.09, breadth 0.11. (*Watson.*)

The specimen from which I have described this is neither full grown nor perfect, but the species is a very well-marked one. It is much more depressed and has the whorls less rounded than *Trochus* (*Margarita*) *euspira*, Dall. Than *Trochus helycinus*, Fabr., it is much more depressed, much more brilliantly nacreous, and the surface is much more polished, and the radiating puckers are much stronger. (*Watson.*)

Off Culebra Id., W. Ind., 390 fms.

T. (Margarita ?) scintillans WATSON, Journ. Linn. Soc. Lond. xiv, p. 712; Challenger Rept., p. 91, t. 5, f. 2.

M. ERYTHROCOMA Dall. Pl. 48, fig. 15.

Shell small depressed conic, yellowish, variegated and articulated with rose-pink and opaque white; whorls rounded, 4 or 5 in number, with a minute smooth nucleus; generally a little carinated on the upper surface, especially the earlier whorls, by one or two prominent spiral riblets; below full and rounded, with a small but well-marked umbilicus. Radiating sculpture of the lines of growth occasionally irregular so as to form faint waves, but usually inconspicuous; spiral sculpture of fine close little-raised threads, with on the upper surface one and on the periphery another stronger thread or carination, seldom nodulous, and stronger on the earlier whorls; the spirals are usually articulated with rose-red and opaque white or greenish-yellow. The base is rounded, finely spirally threaded, umbilicus not carinated nor marked by special sculpture. Aperture rounded, oblique, the margins a little angulated above, thin, simple, joined by a thin layer of callus on the body.

Alt. of largest specimen 5, max. diam. 5.25, diam. of base 4 mill. (Dall.)

Off Sand Key, in 54 fms.; Samana Bay, St. Domingo, and Nassau, Bahamas.

M. erythrocoma DALL, Rep. on 'Blake' Gasterop., Bull. M. C. Z. xviii, p. 375, t. 28, f. 1 (1889).

Var. ? *SAMANÆ* Dall. Shell more depressed, last whorl proportionately larger and aperture much more oblique; umbilicus twisted nearly closed, white, with radiating flexuous striæ; shell colored like the typical form, and with similar early whorls.

Alt. 4.75, max. diam. of base 5.75, min. diam. 4.25 mill.

Samana Bay, 16 fms.

This very pretty little species occurs with *Liotia miniata* in moderate depths of water. The specimen from 54 fms. was probably drifted. It may be distinguished from the *Liotia*, which is about the same size, by the different characters of aperture and umbilicus. There is no northern species which resembles it. (Dall.)

Section BATHYMOPHILA Dall, 1881.

Bathymophila DALL, Bull. M. C. Z. ix, p. 102; l. c. xviii, p. 378.

M. EUSPIRA Dall. Pl. 51, fig. 24; pl. 47, figs. 1, 2, 3.

Shell conical, shining, pearly white, elevated, with a rather obtuse apex; five-whorled, the nucleus translucent, white, and with a

sculpture of strong revolving threads, of which that nearest to the suture is most pronounced, and continues, at first sharp, then with slight waves, then with oblique waves like the "lay" of a stranded rope, and on the last whorl as a succession of well-elevated pinched-up points forming a band next the suture; the others disappear on the third whorl, and for the rest the shell is only marked by faint lines of growth here and there, a little more pronounced in the vicinity of the umbilical callus; periphery with a tendency to carination, base rounded; aperture oblique, rounded, margin sharp, simple, pillar stout, thick, inseparable from a thick white callus which forms a lump over the umbilical pit; end of pillar (broken in specimens seen so far) apparently forming a sort of lump or thickened angle. Suture distinct throughout.

Alt. 5.75, major diam. 6, diam. of aperture, 3 mill.; defl. somewhat less than 90°. (Dall.)

Gulf of Mexico off Culebra Id., etc. 390-805 fms.; also North Atlantic.

M. ? euspira DALL. Bull. M. C. Z. ix, p. 44, 1881.—*M. (Bathymophila) euspira* and var. *nitens* Jeff. (ms.) Dall, l. c., p. 102; Bull. M. C. Z. xviii, p. 378, t. 32, f. 8, 1889.—*Trochus (Oxysteles) euspira* Dall JEFFREYS, P. Z. S. 1883, p. 98, t. 20, f. 6.

The diam. of my largest specimen is about 9 mill. This pretty shell is extremely variable as regards the height of the spire and the sculpture. Some specimens are quite smooth; others are spirally striated throughout, or on the body whorl only, or on the upper whorls, or round the umbilicus; some (var. *coronata*) have a row of beads below the suture. In all my specimens there is a minute tubercle on the broad and fretted pillar near its base, but not at its base. * * * The young are always umbilicate. (Jeffr.)

Subgenus SOLARIELLA Searles Wood.

Solariella SEARLES WOOD, Cat. shells from the Crag, in Ann. and Mag. Nat. Hist., ix, p. 531 (1842). Type, *S. maculata* S. Wood.—CARPENTER, Proc. Cal. Acad. iii, p. 157.—FISCHER, Manuel de Conch., p. 826 (not *Solariella* Adams, Gen. Rec. Moll. p. 431, = *Minolia* Ad.).—*Solariella* 'A. Ad.' DALL, Bull. M. C. Z. xviii, p. 378.—*Mucheroplax* FRIELE, Tungebeveebningen hos de Norske Rhipidoglossa, in Archiv f. Mathematik og Naturvidenskab, Christiania, ii, p. 311, 1877.—SARS, Moll. Reg. Arct. Norv., p. 136, 1878. Type, *M. affinis* Jeffr.

This genus was founded by Wood for an English Crag fossil Trochid, conical in form, with tubular whorls and deep umbilicus, its margin crenulated. The type species, *S. maculata*, is closely allied to the recent *S. amabilis* of Jeffreys. The name has been erroneously used by the brothers Adams for a group of tropical, broadly umbilicated, tubular-whorled Trochids, which later received the name *Minolia*. In 1877, Herman Friele instituted the genus *Machæoplax* (type *M. affinis* Jeffr.,—*amabilis* Jeffr. var.), giving as diagnostic characters the short broad radula, with few (about 10) uncini, and these much larger and differently formed than in *Margarita*. The characters of radula may be compared thus:

<i>Margarita</i> .	<i>Machæoplax</i> (= <i>Solariella</i>).
Radula long.	Radula short, broad.
Median teeth 9–13, subequal, with recurved serrate cusps, and an outer obsolescent cuspless plate lying between the perfect median teeth and the uncini.	Median teeth 5–7, subequal, with serrate cusps, the obsolescent outer lateral of <i>Margarita</i> replaced by a well-developed tooth with denticulate cusp.
Uncini very numerous, the apices recurved, denticulate.	Uncini few (about 10), large, falciform, with entire or feebly denticulate edges.

The little group separated by the writer under the name *Conotrochus* may, as Dr. Dall has suggested to me, belong to *Solariella*; but as its relations seem to be equally close to *Minolia*, I include it for the present in that genus as a section. (See page 197, 268.)

The dentition and operculum of *S. varicosa* are figured on pl. 50, figs. 7, 17.

S. OBSCURA Couthony. Pl. 57, figs. 44, 45.

Shell umbilicate, conical, thin, ashen, whitish or reddish in color; surface lusterless, the dull outer layer very thin, overlying a brilliantly iridescent nacre. Sculpture consisting of a rather prominent spiral ridge or carina at the shoulder of each whorl, beneath which, on the peripheral portion of the whorl, there are several (generally 3 to 6) smaller liræ, often subobsolete; the entire base sometimes shows fine low concentric liræ, but usually they nearly disappear there, becoming visible again around the umbilicus; there are often traces of a few obscure spiral riblets above the supra-peripheral carina. Longitudinally the entire surface is marked by regular,

rather close waves or folds, so low and obtuse as to be frequently almost indistinguishable. The spire is conical; apex rather blunt; apical whorl rather prominent, reddish, corneous or purplish, smooth, rounded; suture impressed; whorls $5\frac{1}{2}$, convex, tubular, the last slightly convex beneath and carinated around the umbilicus. The aperture is oblique, circular, its margins thin and arcuate; there is a slight angle at the base of the columellar lip.

Alt. 8, diam. 9 mill.; frequently smaller.

New England Northward; Nova Zembla; Scandinavia; Behring Sea.

Turbo obscurus COUTHOUX, Bost. Journ. Nat. Hist. ii, p. 100, t. 3, f. 2.—*Margarita obscura* Couth. GOULD, Invert. of Mass., p. 253, fig. 171; BINNEY's edit., p. 283, f. 545.—LECHE, Kongl. Sw. Vet-Akad. Handl. xvi, p. 44, and var. *intermedia*, t. 2, f. 25, and *cinereæ formis*, p. 45.—*Machæroplax obscura* Couth. SARRS, Moll. Reg. Arct. Norv., p. 137, t. 9, f. 5.—*Trochus obscurus* Couth. PHIL., Conchyl. Cab., t. 42, f. 3.—*Machæroplax obscura* var. *planula* VERRILL, Trans. Conn. Acad. Sci. v, p. 531 (1882), and var. *carinata* VERRILL, l. c., p. 532.

Var. PLANULA Verrill.

Another form of *M. obscura* frequently occurs south of Cape Cod, in 15 to 30 fms. In this the base is nearly smooth, with the radiating ribs obsolete, or indicated merely by bands of brownish color, while the spiral lines are entirely wanting, or occur only near the periphery, and often in the umbilicus, which may or may not be defined by an angular border. The body-whorl usually has three or four more or less distinct, but low, angular spiral cinguli, of which the first, just below the suture, usually forms only a slight ridge on the flattened subsutural band, and is often entirely absent: the second, midway between the suture and periphery, is the largest, most prominent, and most constantly present; below this there may be 2 or 3 evident carinæ, or these may be absent, or replaced by several fine spiral cinguli. Transverse low ribs or undulations may be more or less distinct on all the whorls, but more frequently are present on the upper whorls, and obsolete, or nearly so, on the lower ones. (Verrill.) Scarcely distinct enough from *obscura* for a varietal name.

Var. CARINATA Verrill.

This has the form and the large umbilicus of *M. obscura*, but its strong, spiral carinæ and the distinct spiral carina around the um-

bilicus cause it to resemble *Margarita cinerea*. The body-whorl has a distinct subsutural carina and three well-separated, strong, raised carinae below it, the fourth forming a peripheral keel; sometimes smaller intermediate ones occur between the third and fourth, and two or more smaller ones below the periphery; in some examples distinct incised spiral lines cover the whole of the base and inner surface of the umbilicus, while a strongly-marked carina, with a deeper groove each side of it, defines the umbilicus. Transverse undulations are usually well marked on the upper whorls, and sometimes on the base. There are no lamellose lines of growth, so characteristic of *M. cinerea*; and the umbilicus is much larger than in the latter. (*Verrill*.)

Off Martha's Vineyard, in 146 to 335 fms.

Var. *LÆVIS* Friele. Pl. 66, figs. 94, 95, 96.

Shell thin, light flesh-colored, having a faint tinge of mother-of-pearl luster, broad coniform; 5 tumid whorls, of which the ultimate one is frequently somewhat flattened on the lower surface; forming thus, a faint angular margin below the periphery; the spire short but pointed; suture deep; the aperture oblique, oval; the outer lip sharp; umbilicus somewhat wide, and deep. The sculpture sometimes shows only faint lines of growth, and is otherwise perfectly smooth; sometimes there are indistinct indications of spiral grooves.

Alt. 6, diam. $6\frac{1}{2}$ mill. (*Friele*.)

Arctic Ocean, East of Greenland, 300–350 fms.

S. laevis FRIELE, Norwegian North-Atlantic Expedition, Moll., ii, p. 30, t. 12, f. 4, 5, 6, 1886.

The species included in this genus appear to be, in a very great degree, polymorphous; and although this beautiful smooth form is so very unlike all the others of the genus known, yet I am not certain but that transitions to *Sol. obscura* Couth. will be traceable. The traces of spiral sculpture appearing on a couple of specimens of *S. laevis* would appear to indicate this. (*Friele*.)

Var. *BELLA* (Verkrüzen) Sars. Pl. 64, figs. 57, 58.

Shell rather solid, white, pearly, globose-conoid, the spire moderately produced; whorls 5, subangular, regularly increasing, the last less depressed than in *M. obscura*, separated by a distinct, scarcely-impressed suture; aperture dilated beneath, and distinctly angulate; outer lip thin, irregularly indented, inner lip incurved; umbilicus large, deep, circular, its margin lightly defined; surface with rather

prominent spiral ribs, 4 on the last, 2 or 3 on the penultimate whorl, clathrate with elevated, distant longitudinal lines; base sculptured with about 10 impressed spiral lines, decussated by arcuate lines.

Alt. $6\frac{1}{2}$, diam. 7 mill.

Norwegian coast; Off Cape Cod, Mass.; Off Cape Sable, Nova Scotia in 90 fms., etc.

Margarita bella VERKRUZEN, Jahrb. d. Mal. Gesellsch. 1875, p. 236 (no description).—*Machæroplax bella* Verkr. Sars, Moll. Reg. Arct. Norv., p. 137, t. 9, f. 4.—*Machæroplax obscura* var. *bella* Verkr. VERRILL, Trans. Conn. Acad. Sci. v, p. 531 (1882).—*M. bella* Verkr. VERRILL, Proc. U. S. Nat. Mus. 1880, p. 378.

I have no doubt of the intergradation of the forms *bella*, *obscura* and *levis*. These three form a series varying from highly-sculptured to smooth. Verrill's observations on *M. bella* as dredged by him off the New England coast are as follows: It differs from the typical *obscura* chiefly in having the base covered with distinct incised spiral lines. In some specimens the curved radiating ribs or undulations on the base are well marked, as in the typical form, in others they are more or less obsolete. The presence of a slight spiral carina, or angle, bordering the umbilicus, is variable in both forms, being in some specimens, pretty well developed, in others entirely absent. The sculpture on the upper whorls is also variable in both varieties. The transverse ribs are usually more evident in var. *bella*, but they are often equally evident in typical *obscura*.

S. VARICOSA Mighels and Adams. Pl. 66, figs. 16, 17.

Shell small, thin, low, conical, of a dingy white or drab color; whorls 4, convex, covered with numerous longitudinal oblique ribs; intersected by a great number of revolving striæ, which are most conspicuous on the lower part and base of the lower whorl. The striæ on the upper part of the whorls can only be seen with a magnifier. Suture distinct, subcanaliculate; umbilicus rather large and deep, bounded by two rather rugged varices, intersected by the ribs which are continued to the verge of the umbilicus. Aperture circular; labrum simple, sharp; within pearly.

Alt. $6\frac{1}{2}$, diam. $6\frac{1}{2}$ mill. (*Migh. and Ad.*)

Newfoundland Northward; Norway; Nova Zembla.

Margarita varicosa M. and A., Bost. Journ. Nat. Hist. iv, p. 46, t. 4, f. 14 (1842).—GOULD, Binney's edit., p. 285, f. 547.—*Machæroplax varicosa* Migh. Sars, Moll. Reg. Arct. Norv., p. 139, t. 9, f. 2.—*M.*

plicata M. Sars, teste G. O. Sars.—*M. elegantissima* (BEAN MS.) Wood, Crag. Moll. i, p. 134, t. 15, f. 1.—LECHE, Hafs-Moll. Kongl. sw. Akad. Handl. xvi, p. 43.—*M. polaris* DANIELSEN, in Copenhagen Mus. (teste Leche).

S. ALBULA Gould. Pl. 66, figs. 14, 15.

Shell rather solid, whitish, pearly, more or less distinctly tinted with violaceous or rose color, depressed-conoidal; spire short; whorls 6, appressed, the last large; base planulate; suture very slightly impressed; aperture subangulate; outer lip obliquely arcuate, inner nearly vertical; umbilicus large and deep, funnel-shaped, defined by a distinct basal ridge; surface sculptured with slightly elevated unequal spiral lines, decussated by less conspicuous longitudinal striae; base nearly smooth, but with subobsolete spiral lines around the umbilicus. Alt. 9, diam. 10 mill. (Sars.)

Greenland; Norway; Unalaschka.

Marg. albula GLD., Otia, p. 154.—*Machæroplax albula* GLD. Sars, Moll. Reg. Arct. Norv., p. 138, t. 9, f. 3.

S. PERAMABILIS Carpenter. Pl. 67, figs. 59, 60, 61.

Shell very thin, very elegantly sculptured, livid, spotted with pale rufous-brown; nuclear whorls 2, very tumid, smooth, apex mammillated; following whorls 4, tabulated, sutures nearly rectangular; upon the spire there are two or three carinæ, and intercalated carinulæ; the entire surface is most elegantly and densely radiately costate, costæ very acute, subgranulose upon the carinæ, interstices on the first whorl fenestrated, posteriorly decussated; base deeply rounded; sculptured with about 5 lirulæ, anteriorly granulose; umbilicus large, closely ornamented with about 3 spiral distant lines, and radiating costulations continued from the base. Aperture rounded, indented by the carinæ, scarcely in contact parietally, iridescent inside, nacreous; operculum very thin, multispiral, with about 10 elegantly radiately rugulose whorls. (Carpenter.)

Alt. 8, diam. 8 mill.

San Diego; Catalina Id., Cal., 30–120 fms.

Solariella peramabilis CARP., Proc. Cal. Acad. Sci. iii, p. 156 (1864).

Dr. Cooper's very lovely species of a very lovely group may possibly prove to be a variety of the Japanese *Minolia aspecta* A. Ad. mss. in Mus. Cuming; but, until more specimens from each district have been compared, it is more prudent to keep them

separate. It seems to have exhausted the power of sculpture on its graceful habitation. Under the microscope, the sharp transverse lirulæ, mounting over the keels, dividing the interspaces, and even ascending the wide umbilicus, are eminently beautiful. Even the operculum is sculptured with delicate waved radiating lines. It has the aspect of an extremely thin *Torinia*, with a funnel-shaped umbilicus. This is not only bounded by a granular keel, but has three other distant spiral lines crossing the lirulæ. The radiating sculpture is more distant on the upper whorls, where first two, then three keels appear, fenestrated by the lirulæ, which afterward become much closer and are sometimes worn away behind the labrum. (*Carpenter.*)

S. VANCOUVERENSIS E. A. Smith. *Unfigured.*

Shell conical, moderately umbilicated, grayish-white; whorls 5, slightly convex, with oblique flexuous ribs extending from suture to suture, also obscurely spirally striated; last whorl obtrusely angulated at the middle, rather flattened beneath with four or five concentric sulci at the angle, of which the three uppermost are broader than those below, and the interstices or liræ between them are also stouter. The rest of the flattened base is arcuately plicated, or, in other words, exhibits the continuation of the costæ upon the upper half of the volution, which are interrupted by the sulci at the periphery; umbilicus smallish, surrounded by a subtuberculated double ridge; aperture subrotund, flattened at the base, iridescent within. Columella a trifle arcuate, somewhat expanded above, and at the lower extremity forming an angle with the base.

Alt. $6\frac{1}{2}$, diam. $6\frac{1}{4}$ mill; aperture, alt. and breadth nearly 3 mill. (*Smith.*)

Vancouver Island.

Trochus (Margarita) vancouverensis Smith, Ann. and Mag. N. H. 1880, vi, p. 288.

In some places, probably where the superficial calcareous layer is thin, the pearly iridescence beneath it is observable. The oblique flexuous costæ are about 19 in number on the penultimate, and a trifle more numerous upon the last whorl. (*Smith.*)

S. AMABILIS Jeffreys. Pl. 57, fig. 52.

Shell pyramidal, moderately solid, semitransparent, of a pearly and partially iridescent luster; sculpture: two spiral ridges or keels on the upper part of each of the last three or four whorls, and one

on the upper part of the next or smaller whorl, besides several finer but irregular ridges on the base of the last or largest whorl, and numerous minute spiral striae between all the ridges; the principal ridges are placed near the suture of each whorl, both above and below, leaving a broad flattened space in the middle and a narrow excavated space below the suture, thus imparting a tower-like appearance to the shell; the upper whorls are also marked with numerous short and fine longitudinal ribs, which cross the ridges and make them crenelated; color pure pearl-white; spire elevated; apex semiglobose, prominent and slightly twisted; whorls 7, gradually increasing in size; suture very distinct; mouth nearly circular, but angulated or somewhat notched below by the umbilical ridge; outer lip thin and slightly expanded; inner lip folded a little back on the umbilicus, and adhering to the pillar; inside more or less iridescent; umbilicus large but not wide, funnel-shaped, and completely exposing the whole of the inner spire; it is encircled outside by a strong spiral ridge, which is often beaded, and winds like a staircase into the interior; operculum forming a spiral of about a dozen whorls, the edges of which are imbricated and overlap one another in succession. (Jeff.)

Alt. 8 diam, 7 mill.; alt. $7\frac{1}{2}$, diam. $6\frac{1}{2}$ mill. (Jeffreys.)

North Sea off Shetland Is., 85–95 fms.; Gulf of Mexico, Cape Florida to Caribbees, 193–888 fms.

Trochus amabilis JEFFREYS, British Conch. iii, p. 300; v. t. 61, f. 6.—*Solariella amabilis* Jeffr. DALL, Blake Gasteropoda, Bull. M. C. Z. xviii, p. 380 (1889).—*Trochus cinctus* Phil. JEFFREYS, P. Z. S. 1883, p. 97.—*T. affinis* JEFFREYS olim.—*T. cinctus* var. *affinis* JEFFREYS, P. Z. S. 1883, p. 98, t. 20, f. 5.—*Machæroplax affinis* Jeffr. FRIELE, Archiv. f. Math. og Naturvidenskab, ii, p. 313, t. 5, f. 2 (Dentition).—*Machæroplax hidalgoi* FISCHER, Journ. de Conchyl. 1882, p. 51.

A beautiful form, distinguished by the elevated turreted spire bicarinate whorls, etc. The only specimens I have seen are from the Gulf of Mexico. They are more elevated than Jeffrey's types.

"A remarkable variety which I have named *affinis* (pl. 47, fig. 98), and at one time believed to be a distinct species, is finely and closely reticulated; the whorls are rounded and show no trace of angularity; and the umbilicus is not encircled by a keel." (Jeffreys.)

According to Jeffreys, the *M. hidalgoi* Fischer is synonymous. The original description is as follows:

Shell broadly umbilicated, whitish-pearly, thin, conoidal; whorls 5½, convex, separated by gradate suture, ornamented with oblique, dense regular radiating costellæ, and two spiral liræ on the lower part; last whorl ventricose, radiately costellate above, with three acute elevated median spiral cinguli, beneath with obsolete concentric striæ; umbilicus wide, carinated at the periphery, plicate, denticulate; aperture subcircular.

Alt. 5, diam 5 mill. (*Fischer.*)

Gulf of Gascogne, 896–1226 meters.

S. LAMELLOSA Verrill & Smith. Pl. 57, fig 14.

Shell small, fragile, conical, canaliculate, with a wide umbilicus. Whorls five, angulated and carinated below the middle, swollen just below the suture, which lies in a deep channel; they are crossed, above the peripheral carina, by numerous elevated, thin, oblique ribs, which rise into lamellæ near the suture, where they join the carina forming small nodules; between the ribs are fine parallel lines of growth and sometimes a few fine revolving lines. Below the periphery, in line with the posterior edge of the lip, there is a smaller, plain, angular rib, and around the umbilicus there is a strong nodulose rib. Between these ribs, the base is covered with fine revolving lines. Within the umbilicus are radiating raised lines which cross two or three small revolving ribs. Aperture rounded, with angles corresponding to the ribs.

Alt. 3, diam. 3 mill. (*Verrill.*)

Off Martha's Vineyard, in 115 fms.; *Gulf of Mexico* 287–2805 fms.

Margarita lamellosa VERRILL and SMITH, *Am. Journ. Sci.*, 3d series, vol. 20, p. 397; *Trans. Conn. Acad.*, p. 530, t. 57, f. 38.—*Solariella lamellosa* V. & S., DALL, 'Blake' *Gastrop.*, p. 379.

Constantly smaller and differently wrinkled from *S. amabilis*. (*Dall.*)

S. ÆGLEES Watson. Pl. 66, figs. 18, 19.

Shell broadly conical, high, with a very large umbilicus, ornamented with rows of tubercles, carinated. Sculpture: spirals—there is a row of small round pointed tubercles a little below the suture, the carina is double, formed by two rather remote tubercled threads, the lower of which runs to the outer lip. Below this one is a broadish furrow and slightly beaded thread, which toward the mouth projects so as to become a third carina. The center of the base has another slightly beaded thread; and another formed of

remote rounded tubercles, defining the umbilicus, within which is a very slight furrow and an ill-defined ridge. Longitudinals—the apical whorls are ribbed, but the ribs gradually break into the scarcely connected tubercles of the last whorl. The lines of growth are hardly perceptible, except on the base. Color pure white when weathered, but apparently slightly brownish when fresh, with a pearly nacre below the thin calcareous surface-layer. Spire high, very slightly scalar. Apex sharp, minute, flattened on the one side, with the very small embryonic $1\frac{1}{2}$ whorl rising sharply on the other. Whorls 7, of regular increase; the last is small, from the large part of it cut out by the umbilicus; they are flatly conical and slightly scalar. Suture linear, but strongly defined by the right-angled junction of the whorl. Mouth oblique, much inclined to the axial line, rectangularly rounded, the pillar and outer lip being parallel. Outer lip thin and broken, not descending. Pillar-lip shortly but flatly bent over the umbilicus, and here it is patulous and sinuated, it then advances in a straight line toward the base. It is toothed in the middle by a strongish spiral protuberance at which point it projects; but from this to the junction with the base it is thin and retreats. Umbilicus very large, funnel-shaped and pervious.

Alt. 0.27 in.; diam. 0.3, least 0.25. Mouth, height 0.1, breadth. 0.15 in. (*Watson.*)

This very beautiful species is well defined by its exactly conical form and very large umbilicus, which cuts the whole body out of the inside of the last whorl, narrowing the base to an extraordinary extent. The young shells are excessively like those of *Trochus* (*Ziziphinus*) *tiara*, Wats., but are flatter, broader, and more umbilicated. (*Watson.*)

Gulf of Mexico, 287–888 fms.

T. (Margarita) aegleës WATSON, Journ. Linn. Soc., Lond. xiv, p. 704, 1879; Challenger Gasterop., p. 81, t. 5, f. 10.—*Margarita aegleis* Watson, DALL, Bull. M. C. Z. ix, p. 40, 1881.—*Solariella aegleis* Watson, DALL, Bull. M. C. Z. xviii, p. 379, 1889.

Dr. Dall unites with this species as varieties, the *rhina* and *clavata* of Watson. I have no doubt of the correctness of his views.

Var. *RHINA* Watson. Pl. 64, figs. 51, 52.

Shell conical, with a broad and tumid base and a wide narrowed umbilicus; surface cross-hatched like a file; when fresh, translucent with a pearly sheen. Sculpture: spirals—there are three to five slightly raised remotely beaded threads, of which one lies a little be-

low the suture, one at the periphery forming a carina, of which the beads are much smaller and closer set, sometimes evanescent; one, with beads like the first, defines the umbilicus, within which there is a strong spiral ridge; and the whole surface is covered with fine rather sharp threads, whose partings are twice as broad as themselves. Of these finer spirals, the one which meets the outer lip often rises into prominence and defines the base, while another above the carina sometimes stands out more strongly and more beaded than the rest. Longitudinals—the whole surface is close-set with these, which are crossed by the spirals, than which they are broader but less sharp, closer-set, and more irregular and interrupted, especially near the upper line of tubercles and near the umbilicus. Color a bluish white when alive, with a translucent calcareous layer through which the nacre shines. Spire high, a little scalar. Apex small, a little flattened, with the embryonic $1\frac{1}{2}$ whorl barely projecting in the middle. Whorls 6–7, the last is of rapid increase, full rounded and a little tumid; the preceding ones are a little roundedly shouldered below the suture, flat on the contour angulated at the carina, and slightly contracted into the suture; the apical whorls are simply rounded and longitudinally ribbed, suture is linear, but strongly, not acutely defined by the perpendicular rise of the whorl above it and the slight sloping shoulder below. Mouth round, scarcely oblique, with a translucent porcelaneous edge, and pearly within. Outer lip not descending, sharp; its inner edge is beveled outwards at the expense of the pearly layer. Pillar-lip bends over the umbilicus, is a little reverted, and expands into a tooth at the intra-umbilical ridge. Umbilicus funnel-shaped, wide, pervious, but narrowed within by the spiral ridge. Operculum of very many narrow whorls, which on their outer edge overlap as a narrow gleaming flange.

Alt. 0.32 in., diam. 0.32 in., least 0.28 in. Mouth, height 0.18, breadth 0.18 in. (*Watson.*)

This is a much larger species than *Trochus* (*Margarita*) *cinereus*, Couth.; from the North Atlantic, much higher, much more conical, much more exquisitely sculptured, suture more impressed, base more tumid and not angulated at the edge, umbilicus larger. Than *Trochus* (*Margarita*) *amabilis* Jeffr., it is, of course, still larger, less conical, less angulated, the sutural impression is not like a rounded gouged-out line as it is there, the base is not flattened, and the whole

style of sculpture is totally different. The measurements given above are taken from an almost exceptionally fine specimen. (*Watson.*)

Off Azores Is., 450–1000 fms.

T. (Margarita) lima WATSON, Journ. Linn. Soc. Lond. xiv, p. 703 (not *lima* Phil.).—*T. (Margarita) rhina* WATSON, Challenger Gasterop., p. 80, t. 5, f. 1.

Var. *CLAVATA* Watson. Pl. 66, figs. 98, 99.

Shell small, conical, with a high spire and a tumid base, a round mouth, and a deep umbilicus, and covered with sharp prickles. Sculpture: spirals—there are several small threads, two of which, of equal strength and prominence, angulate the whorls—one at the basal contraction, the other about half way up the whorl; on the base they are somewhat closer set. The outer lip does not meet the carinal thread, but the one below. Longitudinals—the whole surface is crossed by close-set, slightly oblique narrow laminae, which, in crossing the spirals, rise into sharp vaulted prickles whose faces are turned towards the mouth. Color white, with a pearly luster. Spire very high. Apex minute, with the small embryonic $1\frac{1}{2}$ whorl rising from a minute flat. Whorls $6\frac{1}{2}$, angulated and narrow in the spire, but the last inflated and expanded. Suture deeply impressed, somewhat depressed, and very strongly defined. Mouth perpendicular, round, slightly pointed on the base, and angulated at the upper carina. Outer lip sharp, advancing far across the body towards the pillar-lip. Pillar-lip depressed upon the umbilicus, then rounded and sinuated, slightly toothed at the point of the pillar. Umbilicus wide and deep, but internally narrowed.

Alt. .17 in. diam. .13. Mouth, height 0.07, breadth 0.07 in. (*Watson.*)

The peculiarly high narrow spire and the vaulted prickles are very characteristic features of this species, none of the specimens of which are adult. When full grown there would probably be an additional whorl, which would add a broad base to the high narrow spire. There seems to be some variation in the number of the spirals. I have put a query to the specimens from Pernambuco, because, though identical in other respects, the embryonic whorls are slightly larger and more tumid. The curves of the mouth-edge have some suspicion of an infra-sutural sinus, and the form of the pillar is also suggestive of *Basilissa*, but the form of the mouth is wholly unlike that genus. (*Watson.*)

Off Culebra Id., W. Ind., 350 fms.; *off Pernambuco*, 675 fms.

T. (*Margarita*) *clavatus* WATSON, Journ. Linn. Soc. Lond. xiv, p. 705; Challenger Rep. Gasterop., p. 82, t. 5, f. 8.—*Solariella wgleis* var. *clavata* Watson, DALL, Bull. M. C. Z. xviii, p. 380.

S. INFUNDIBULUM Watson. Pl. 66, fig. 97.

Shell conical, with a tumid base, carinated, umbilicated, thin, translucent, pearly. Sculpture: spirals on the upper whorls 2, on the body whorls 7–8, pretty strong, but fine beaded threads. The first lies remote below the suture, and is sparsely ornamented by longitudinally produced, high and pointed, tubercles; it forms a shoulder on the whorl. The second projects strongly and sharply at the periphery and forms the carina; it and those below are delicately fretted with close-set small beads. The third, which meets the outer lip, lies within the contraction of the base. The last two are closer than the rest, which, however, are sometimes brought closer by the additional thread which appears among them. The one which defines the umbilicus is more sharply beaded than the rest. Longitudinals—below the suture and near the umbilicus the surface is sharply but delicately puckered, and these puckerings, strong in the early whorls, are in the later faintly continued across the whorls as lines of growth. Color yellowish white, with a brilliant nacreous sheen shining through the thin superficial calcareous layer, which becomes more opaque in drying. Spire high, scalar. Apex minute, flattened, with the minute bulbous embryonic 1½ whorl projecting on one side. Whorls 8, of rapid increase, rounded, but angulated by the projection of the spirals, very tumid on the base. Suture linear, but strongly defined by the contraction of the suprajacent whorl and the flat shoulder of the one below. Mouth very slightly oblique, round, but on the pillar flattened, and at the point of it angulated slightly, nacreous within; across the body there is no pad, but the shell is eroded, and this erosion has the appearance of a thin callus. Outer lip thin, not descending. Pillar-lip slightly patulous, bending flatly over the umbilicus, and then advancing in a straight line to the point of the pillar, where it is slightly angulated just where the beaded umbilical spiral ends. Umbilicus funnel-shaped, rather open, but a good deal contracted within. Sharply scored with the lines of growth. Operculum yellow, horny, very thin, of 7 to 8 whorls.

Alt. .81 in., diam. .65, least 0.59. Mouth, height 0.37, breadth 0.35 in. (*Watson.*)

The beautiful species, of very singular aspect, recalls in a very general way the form of *Turcica monilifera*, A. Ad., but differs from that in its rounded contours, strongly contracted suture, umbilicus, and straight untoothed pillar. It resembles in form *Margarita aspecta*, A. Ad., but that is less tumid, is carinated, its umbilicus is much smaller, the spirals are many more, and they are not tubercled. It is very like *Trochus ottoï* Phil., a fossil from Messina, lately taken alive in abundance by Professor Verrill off the New England coast in 115 to 500 fathoms, and published by him as *Margarita regalis*. *Trochus infundibulum* may, after all, be only a variety, but compared to that this is larger, higher in proportion to breadth, has the base much more tumid, and the longitudinals far weaker. In *Trochus ottoï* Phil., these longitudinals are very strong, and make sharper, higher, crisper nodules on the spirals; that species, too, has not the subsutural flat with its radiating bars and its border of tubercles, and has not the spiral uniting that first row of tubercles. As to the infra-umbilical spirals they vary astonishingly. (*Watson*.)

Off Bermuda, 1075 fms.; *Marion Id., Indian O.*, 1375 fms.; *Off Guadalupe*, 769 fms.

Tr. (Margarita) infundibulum WATSON, Journ. Linn. Soc. Lond., xiv, p. 707, 1879; Challenger Rep., p. 84, t. 5, f. 5.—*Solariella infundibulum* Watson, DALL, Blake Gasterop., Bull. M. C. Z. xviii, p. 380, 1889; The Nautilus, 1889, p. 1. (*Anatomy*.)

The external anatomy and genitalia have been described by Dall.

S. ottoï Philippi. Pl. 57, fig. 17.

Shell rather large for the genus, thin and delicate, whitish, brilliantly iridescent or pearly, externally and internally, broad conical, turreted, wider than high, with a convex base, and deep umbilicus. Whorls seven, much flattened, with the suture scarcely impressed; the upper whorls are coronated by two, and the body-whorl by three, revolving, strongly nodulous ribs, along which the conical, often acute nodules are very regularly arranged. The first of these rows of nodules is just below the suture; the second is separated from the first by a wide, flat, or slightly concave interspace; the third is not far from the second, and surrounds the periphery, usually corresponding with the line of the suture; the second and third are usually the most elevated; on the base there are five or six strong, rounded, revolving ribs, part of them usually somewhat nodulous, separated by deep, concave interspaces, rather wider than

the ribs; one or two additional ones often appear in the umbilical opening, which is funnel-shaped and moderately large, but often partially obstructed by the reflexed edge of the inner lip. The interspaces between all the ribs are covered with close, slightly raised lines of growth, and usually with traces of a thin epidermis. Aperture somewhat quadrangular, large, lip thin. Animal with long tentacles and large black eyes; four large lateral cirri on each side, with a group of four or five small intermediate ones; snout with a broad, bilobed, crescent-shaped expansion in front. Odontophore without a large lateral tooth between the inner and outer series, otherwise much like typical *Margarita*. Alt. 14, diam. 15 mill. (Verrill.)

Off Martha's Vineyard, 65 to 192 fms.; *off Newport, R. I.*, 85-325 fms.; *off Grenada*, 416 fms.; *Bay of Biscay*; *between Hebrides and Faroë Is.*; *Mediterranean*; *St. Thomas, W. I.*; *Fossil and Pliocene of Italy and Sicily*.

Trochus ottoï PHILIPPI, Enum. Moll. Siciliæ, ii, p. 227, t. 28, f. 9, 1844.—JEFFREYS, P. Z. S. 1883, p. 98.—*Solariella ottoï* Phil., DALL, Blake Gasterop., Bull. M. C. Z. xviii, p. 381.—*Margarita regalis* VERRILL and SMITH, Amer. Journ. Sci. 1880, p. 397; Trans. Conn. Acad. v, p. 530, t. 57, f. 37; vi, p. 254, t. 29, f. 14.

The description and figures pertain to this species as dredged living, and described by Verrill and Smith as *M. regalis*.

S. VAILLANTI Fischer. *Unfigured*.

Shell umbilicate, conic; whorls 7, planulate, the first costellate, the rest ornamented with acute tubercles arranged in two spiral cinguli; last whorl bicingulate at the periphery, above provided with a beaded sutural cingulus, beneath sculptured with 5 concentric liræ.

Alt. 7, diam. 8 mill.⁶ (Fischer.)

Portugal, 1224 meters.

Trochus vaillanti FISCHER, Journ. de Conchyl. 1882, p. 50.

Said by Jeffreys to be a synonym of *S. ottoï* Phil.

S. LUSITANICA Fischer. *Unfigured*.

Shell umbilicate, orbicular-conic; whorls 7, regularly increasing, spirally delicately cingulate, decussated by very minute arcuate costellæ, with an acute prominent median carina; last whorl bicarinate, a little convex beneath, sculptured with concentric lines, vanishing in the middle; umbilicus funnel-shaped, acutely angulate

at margin; aperture rhomboidal; columella margin subdentate at base. Alt. 5, diam. 7 mill. (*Fischer.*)

Portugal, 3307 meters.

Trochus (Solarrella) lusitanicus FISCHER, Journ. de Conchyl. 1882, p. 51.

S. LISSOCONA Dall. Pl. 48, figs. 23, 24.

This species belongs to the same group as the last three mentioned species, but is nearest to the last. The shell is more simply conical, consisting of six and a half whorls, which glisten with that peculiar spun-glass or flossy luster noticeable in so many abyssal species; the nuclear whorls as in the last; then the sculpture consists of two lines closely appressed to the sutures, less prominent and less conspicuously provided with the angular projections than in the last species. Between the upper and lower lines the surface of the whorl is smooth, except for lines of growth, shining as above described, and seems even a little concave. The nodules on the upper carina of one whorl fit into the spaces between the nodules on the lower carina of the preceding whorl, and thus alternate along the line of the suture and give it a wavy character. The carina on the last whorl is seen to be formed by two threads, which constitute the periphery, with fainter angularities than the others. The base is somewhat inflated, with two sharp, smooth threads between the periphery and the nodulate boundary of the small funnel-shaped umbilicus. The lines of growth are much as in the last species, the umbilicus is not infringed upon by any reflection of the pillar-lip, and the aperture is about as wide as high, and less distinctly rectangular.

Alt. 5.5, diam. of base, 4.5. Lat. of aperture, 2 mill. (*Dall.*)

Northern Central Gulf of Mexico, 331 fms.

Margarita lissocona DALL, Bull. M. C. Z. ix, p. 41, 1881; *Solarrella lissocona* DALL, Bull. M. C. Z. xviii, p. 381. t. 21, f. 8 1889.

S. LACUNELLA Dall. Pl. 51, figs. 32, 33.

Shell in general form and sculpture much resembling the last, but, without the nacreous coloring, stouter and coarser in every respect, whorls five, the revolving threads on the upper side of the whorls only seven in number (on the last whorl), of which the inner two are crenulated by the radiating plications which otherwise are visible only as radiating threads in the interspaces, the base rounded with nine flattened revolving ribs separated only by incised lines and crossed by delicate lines of growth. The umbilicus much

smaller than in the last, bordered by two nodulous ribs with a remarkably deep groove between them; aperture as in the last, but not so distinctly angulated; shell variously painted with brown on a yellowish-white ground; one specimen has five distinct brown patches on the upper side of the last whorl, another has more numerous radiating brown streaks; the base is whitish, and in adults there is a thickening of the inside of the aperture all around, but least on the pillar.

Alt. 4.5, maj. diam. 5.0. Diam. of aperture, 2.25; of umbilicus, 1.0 mill. (*Dall.*)

Off Santa Cruz, 115 fms.; *Off North Carolina Coast*, 25-124 fms.

Margarita maculata DALL, Bull. M. C. Z. ix, p. 43, 1881, not of Searles Wood, 1842.—*M. lucunella* DALL *op. cit.*, p. 102.—*Solariella lucunella* DALL, Blake Gasterop., Bull. M. C. Z. xviii, p. 381, t. 21, f. 1, 1889.

This species is nearest to *Tr. cinctus* Phil., but differs in so many details of sculpture that I do not see my way clear to unite them at present. The coloration is variable; some are clouded with olive and others with pinkish brown. A variety *depressa* has the spire low and somewhat tabulated by a smooth space between the suture and the spiral ribs. (*Dall.*)

S. IRIS Dall. Pl. 51, figs. 30, 31.

Shell thin, brilliantly nacreous, inflated, depressed-conical, five whorled; spire obtuse; nucleus polished, smooth, very minute; remainder of shell sculptured with fine revolving lines, subequal, about as wide as the interspaces, about eighteen at the beginning of the last whorl; these are crossed by slight plications, beginning near the suture, becoming nodulous on a single prominent thread a little way from the suture (which is thus made to appear somewhat channelled), becoming faint about the middle of the upper side of the whorl, and entirely disappearing before reaching the periphery; the revolving lines are fainter on the rounded base; the umbilicus is wide and funnel-shaped, bordered by a strong keel with about twenty-five rounded nodules, the inner walls of the umbilicus with strong revolving lines delicately reticulated by the lines of growth. The whorls are rounded, with no carina at the periphery; the pillar thin, arched not reflected; the aperture nearly round, but angulated above by the sutural thread, and below by the umbilical keel; edges

simple not thickened; operculum thin, corneous, multispiral; shell nacreous, with delicate suffused splashes of brown.

Alt. 5, maj. diam. 5.5. Diam. of aperture, 2; of umbilicus, 2.75 mill. (*Dall.*)

Sand Key, 119 fms.

Margarita iris DALL, Bull. M. C. Z. ix, p. 43, 1881.—*Solariella iris* DALL, Bull. M. C. Z. xviii, p. 382, t. 21, f. 7, 1889.

Only one specimen of this form has been found. The upper surface much resembles that of *S. lacunella*, but the base, especially the umbilicus, is altogether different, the shell is thinner and much more pearly, and the spiral lines are much finer. (*Dall.*)

S. LUBRICA Dall. Pl. 51, figs. 25, 26.

Shell small, conical, white, shining, with a slight nacreous hue; whorls five full and rounded; suture distinct; from about the beginning of the third whorl a row of round nodules extends along the upper line of the whorls just below the suture, about twenty-five on the last whorl and more faintly defined near the aperture; base perforated by a small umbilicus bounded by a thickened raised line, within which are about twelve plications extending up into the umbilicus; outside of this line a few radiating impressed lines extend toward the outer part of the whorl; faint lines of growth are here and there visible on the polished surface; aperture nearly circular, thin edged, simple; the pillar slightly extended on the umbilical side, not thickened.

Alt. 4, maj. diam. 3.25. Diam. of aperture 1.5; of umbilicus .5 mill.

Off Santa Lucia, 115 fms.

Margarita lubrica DALL, Bull. M. C. Z. ix, p. 44, 1881.—*Solariella lubrica* DALL, Bull. M. C. Z. xviii, p. 382, t. 21, f. 9, 1889.

Var. *iridea* Dall. Shell without the coronation at the suture or only slight traces of it, umbilical carina less strong, umbilicus smaller, whorls inflated, very round, brilliantly pearly, base wider than in the type. (*Dall.*)

This extremely lovely little shell, when fresh, has a most brilliant greenish nacre shining like a diamond beetle. The variety was dredged by the U. S. Fish Commission off Cape Florida in 193 fms. (*Dall.*)

S. RHYSUS Watson. Pl. 66, figs. 9, 10.

Shell small, conical, scalar, with rounded base and large umbilicus, sculptured. Sculpture: spirals—there is a double, tubercled

carina, of which the basal one meets the outer lip; the upper and stronger angulates the whorl about two-fifths from the base; less than one-fifth from the suture is a shoulder formed by a row of stronger remoter tubercles scarcely connected by a thread. On the base are two feebly beaded threads, another strongly beaded defines the umbilicus, close within which lies another delicately and remotely beaded. Longitudinals—the top whorls are strongly ribbed, but further down these ribs break into tubercles and become disconnected; but traces of these longitudinals remain here and there. The lines of growth are very faint. Color white, with a pearly luster. Spire high, scalar. Apex not fine, rounded, with the inflated 1½ embryonic whorl standing out prominently. Whorls 6, flat below the suture, angulated at the first spiral, below which the profile line is flatly conical; it is angulated at the second spiral, and then contracts into the suture below. Suture acutely angulately impressed. Mouth round, angulated at the front of the pillar. Pillar-lip slowly and slightly bent over the umbilicus. Umbilicus open, funnel-shaped, internally scored with minute longitudinal ribs.

Alt. .25, diam. .21, least diam., .18 in. (*Watson.*)

The specimen from which I have described this is in bad condition; but the species is certainly distinct from any other known to me. (*Watson.*)

Off Setubal, 470 fms.; *Off Sombrero Id.*, *W. I.*, 450 fms.

Tr. (Margarita) rhysus WATSON, *Jour. Linn. Soc. Lond.*, xiv, p. 706; *Challenger Rep.*, *Gasterop.*, p. 83, t. 5, f. 4.

S. PACHYCHILES Watson. Pl. 64, figs. 60, 61.

Shell small, conical, with the last whorl tumid, especially toward the mouth, which is extremely oblique, and has a thickened lip; carinate, widely umbilicate. Sculpture: spirals—in the center of the body-whorl is a strong carinal thread, which almost runs into the outer lip at its junction with the body, but just lies above it, and so stands out round the base of the whole earlier whorls; this thread is set with strong, sharp, remote tubercles, which become feebler and more crowded toward the mouth; half way between the carina and the suture is another thread set with feebler tubercles; these two threads only appear on the second regular whorl, but on the body-whorl, especially towards the mouth, many others make their appearance; a little below the carina, and issuing from the junction of the outer lip is a feebler tubercled thread, defining the base. On the base

are three strong closely-beaded threads, the inmost of which defines the umbilicus, within which is a finer beaded thread, and, deep inside a ridge. Longitudinals—all the upper whorls are crossed by strong straight ribs, forming tubercles where they cross the spirals, and leaving deep square hollows between. Only on the penultimate whorl do these become oblique and feebler, till toward the mouth they are narrow, weak, crowded, and broken. Besides these, the whole surface is roughened with small, coarse, irregular lines of growth. Color dead white. Spire high and conical, but the tumidity of the last whorl, especially towards the mouth, greatly detracts from this; it is slightly scalar. Apex small, whorls 6, of slow increase till the last, angular, projecting out squarely from the suture, flattened on the contour, and contracted below the carina; but the last whorl is rounded, tumid, and toward the mouth, expanded. The base is rounded, but not inflated. Suture very deep and strong, from the overhanging of the carina above it. Mouth extremely oblique, perfectly round but for a slight flatness across the body and an angulation at the insertion of the outer lip and also at the junction of the pillar-lip to the body; pearly within. Outer lip very slightly descending at its insertion, then in its sweep rising a little; it is scarcely angulated at the lower carina and at the point of the pillar, but it is a little sinuated at that part; it is thin on the edge, but is thickened within by a pretty strong pearly callus and outside by a slight rounded marginal varix. Pillar-lip is hollowed back into the pillar in a sinus, and is sharply reverted, so as to leave a minute but deep furrow behind it; this reversion ceases just before it reaches the umbilical thread, and forms a minute tooth at that point. Umbilicus wide and pervious, and narrowed within; its slope is scored with minute sharp curved laminae, the remains of the old edges of the pillar-lip sinus.

Alt. .18, diam. .27, least .17. Mouth, height, .1, breadth .1 in. (*Watson.*)

In general aspect this is very like *Trochus* (*Margarita*) *gemma* *lucida*, A. Ad., but that species has the spire lower, the suture distinctly depressed, the sutural furrow is beset with close radiating striae, the spiral threads are more numerous and crowded, the pointed tubercles on these are more frequent, and there is no varix on the outer lip. This last is a feature which gives a great peculiarity to this species; but the thickening and the patulousness of the lip are not sufficient

to connect it with Gaza. The distinct umbilicus and the absence of a tooth narrowing the mouth separate it obviously from *Craspedotus*. (*Watson.*)

Philippines, 82 fms.

Tr. (Margarita) pachychiles WATSON, Journ. Linn. Soc. xiv, p. 708; Challenger Rep. Gasterop., p. 87, t. 5, f. 11.

S. DNOPHERUS Watson. Pl. 66, figs. 20, 21.

Shell depressedly conical, rather strong, semitransparent, of a dark pearly iridescence. Sculpture: there are spiral ridges, strong, five above the base; the first is close to the suture, and is exquisitely beaded from the middle of the second whorl. The second ridge is remote from the first, and forms a shoulder to the whorls. The third, fourth, and fifth occupy the periphery, which is carinated by the fourth till close up to the mouth, where the fifth forms the carina. Four fine threads, of which the first is partially beaded, lie in the flat between the first and second ridges; two between the second and third; one between the third and fourth. Below the fifth ridge is a flat furrow narrower than the rest; below the furrow is a sixth ridge, slighter than the others; and then the base is closely covered with eleven spiral threads, which tend to become stronger and wider apart near the umbilicus. The first three ridges alone appear on the upper whorls. Longitudinally the whole surface is sharply scored by the lines of growth. Color a ruddy brownish-white, shot with a purple and green iridescence. Spire depressedly scalar. Apex bluntly mammillated by the somewhat shapeless, round, largish, glassy, ruddy, embryonic whorl. Whorls 4½, of rather rapid increase, suture somewhat faint. Mouth oblique, roundish, being slightly peaked above and a little angulated on the pillar. Outer lip sharp but not thin, brilliantly iridescent within. Inner lip very much thickened by a pearly pad, which is very thick below where it envelops what might otherwise have been a tooth on the point of the pillar. The pad is thinner in the middle of the pillar, and thickens again at the junction with the body-whorl, on which it thins out quickly. The lip here is very slightly reflected on the umbilicus. Umbilicus very small and contracted, not so much by the reflection of the inner lip as by the pillar being bent round across it. Operculum very thin, yellow, horny, with about eleven very faintly defined turns.

Alt. .28 in.; diam. 0.37, least 0.26. Penultimate whorl, 0.08. Mouth, height 0.2, breadth 0.2, inch. (*Watson.*)

This species has a close general resemblance to *Margarita obscura*, Couth., but that is smaller, of slower increase, has an open umbilicus, is very dull in color, and has much fewer spirals, besides which the whole minute system of spirals is different; the tubercled spiral, in particular, is the second, not the first, as here, and is not close to the suture. Than *Margarita loculosa* Gould, which it resembles in its style of spirals, this is more discoidal, and is especially more tabulated below the suture; the angulation here is on the upper, not on the lower part of the whorl and in that the infra-sutural thread is not beaded. (Watson.)

Tr. (Margarita) dnopherus WATSON, Journ. Linn. Soc. Lond. xiv, p. 711; Challenger Rep., Gasterop., p. 90, t. 5, f. 3.

S. AZORENSIS Watson. Pl. 66, figs. 4, 5.

Animal dark in color. Operculum rather strong, dark horn-color, of very many narrow whorls, which on the outside are flanged with a thin, narrow, overlying border.

Shell small, strong, but not thick, conoidal, high, with rounded contours, slightly angulated, scalar, sculptured, whitish, with a slightly flattened base and a small umbilicus. Sculpture: spirals—there are very many close, unequal, irregular small furrows, which are feebler on the base and strongest near the suture, which is margined below by a narrow smooth line around the top of the whorl. In the center of the base is an umbilical depression with spiral threads in the bottom, and within this is a strong white porcelaneous spiral cord, which almost closes the umbilicus. Longitudinals—the top of the whorls is gathered into broad rounded oblique puckers, which die out before reaching the suture or the base. Besides these, the whole surface, spiral furrows and all, is sharply scratched with very close and numerous lines of growth. Color yellowish translucent white, with a dull all pervading nacreous gleam. The strong cord which fills the umbilicus is white, as is also the apex. Spire high, scalar, the separate whorls being a good deal sunk into one another, as well as flattened below the suture. Apex small, rounded, the minute embryonic $1\frac{1}{4}$ whorls barely projecting. Whorls 6, of regular increase. Slightly flattened below the suture rounded on the contour, barely contracted round their base; the last is faintly angulated at the periphery, and not much rounded on the base. Suture strongly marked by the contraction of the whorl above and the margination below. Mouth

oblique, round. Outer lip sharp but strong, porcelaneous on the edge, brilliantly nacreous within; it descends very slightly. Pillar-lip thick, white, bent nearly to the point of the pillar over the umbilicus. It would be reverted but for the great thickness of the spiral pad, which comes twining up behind it out of the umbilicus, and out of which, at the point of the pillar, it forms a flat, triangular, tooth-like expansion. Umbilicus a minute spiral hole, which twists in between the overlying pillar-lip and the umbilical pad; the edge is corrugated with the old lines of the lip.

Alt. 0·33 in., diam. 0·4, least 0·3. Penultimate whorl, 0·1. Mouth, height 0·2, breadth 0·17. (*Watson.*)

This species somewhat resembles in form *Trochus tumidus*, Mont.; but, apart from differences of texture, color, and sculpture, it is, than that, less conical, more scalar, the suture is much more impressed, and the whorls are more immersed. From *Trochus (Margarita) rhina*, Wats., it differs in the whorls being much more tumid and the general form less conical. From *Trochus (Margarita) pompholugotus*, Wats., it differs in the last whorl being far less tumid and out of proportion to those which precede. In contrast with *Trochus (Margarita) dnopherus*, Wats., the pad on the pillar-lip is here rather on the outside, with the lip flattened out upon it, while in that species the thickening is on the inside, filling up the lip. There is a general resemblance to *Trochus marginulatus*, Phil., but the whole sculpture is quite different; especially on the base that species has a sharp umbilical carina, and a wide funnel-shaped though shallow umbilicus. Taken in general, it most of all resembles *Trochus (Margarita) varicosus*, Migh. (= *Trochus polaris* Daniels.). Compared to that this species is stronger in the shell, and much more distinctly sculptured. That other is higher in the spire, narrower, with a higher and more tumid body whorl; the whole sculpture, though quite of the same type, is feebler, the base is more flatly conical, more radiatingly striate with a large funnel-shaped umbilicus which has a double cord round its edge; the embryonic apex is much larger and coarser, and is altogether more prominent, and consists of nearly one whorl and three-quarters, and the whole shell is in every way larger, with $5\frac{1}{4}$ whorls against 6 here. (*Watson.*)

Fayal, Azores, 450 fms.

T. (Margarita) azorensis WATSON, Journ. Linn. Soc. Lond. xiv, p. 710; Challenger Rep., Gasterop., p. 88, t. 5, f. 12.

S. SCABRIUSCULA Dall. Pl. 51, figs. 28, 29.

Shell white, conical, compact, very thin, with a silky luster; whorls, five to six, suture not channelled; nucleus bulbous, polished, smooth; next whorl and a half having a sculpture of slightly raised ribs like a minute *Scalaria*; on the following whorls the upper surface decorated with two carinæ, sculptured with closely set, angular, buttressed projections, like those figured by Watson on the carinæ of *Trochus clavatus* (Pl. 5, fig. 8), but the buttresses are not continuous over the whorl, so as to form transverse ribs, and the second carina is within the periphery of the last whorl, which is bordered by a sharp angular carina, without nodules or projections; two similar, but slightly nodulated, intervene on the somewhat rounded base between the last and the nodulated boundary of the umbilical chink, which is nearly filled by the reflected pillar; the lines of growth radiate in a wavy manner from the umbilicus over the whorl, and constitute the remaining sculpture; there are no longitudinal striæ of any kind, nor any ribs except those described; the aperture is nearly rectangular, a little wider than high, the sides of the spire are rather a little inflated than simply conical.

Alt. 4.75, diam. of base 4; lat. of aperture 1.62 alt. 1.12 mill. (*Dall.*)

Gulf of Mexico, Southern part, 539 fms.

Margarita scabriuscula DALL, Bull. M. C. Z. ix, p. 41.—*Solariella scabriuscula* DALL, 'Blake' Rep. Gasterop., Bull. M. C. Z. xviii, p. 379, t. 21, f. 10.

Subgenus *TURCICULA* Dall, 1881.

Turcicula DALL, Bull. M. C. Z. ix, p. 42, 1881.

T. IMPERIALIS Dall. Pl. 49, figs. 29, 30.

Shell with five (?) whorls, globosely conical, white, extremely thin; umbilicus reduced to a mere chink under the thin callus of the upper part of the pillar lip. Mouth rounded rectangular, pillar somewhat concave, margins all thin; base flattened convex, with seven revolving ribs, the outermost of which is just within the periphery, crossed by radiating lines of growth, regular and very fine, but raised into low, very sharp lamellæ which pass over the periphery onto the upper surface of the whorl; the last is provided with two strong revolving ribs, one of which forms the periphery, while the other lies a little less than half way from the first toward the suture;

two indistinct threads run in the vicinity of the suture; on the revolving ribs above mentioned there are regularly disposed sharp rough tubercles (seventeen on the last whorl), most prominent on the middle carina; the above-mentioned lamellæ are arranged with a regular irregularity (which gives a shagreened appearance to the surface) between the carinæ, and are still coarser and more elevated over the threads near the suture, forming there a double row of scales partly obscuring the suture, which is nevertheless rather deep.

Alt. of last whorl 10, diam. 13; alt. of aperture, 5.5, lat. of same 6.25 mill. (*Dall.*)

The single specimen taken, though destitute of the apical whorls, seemed too remarkable to leave undescribed. It has a general resemblance to some of A. Adams's species of *Turcica*, from Eastern seas, but has a peculiar and remarkable sculpture and wants the teeth on the pillar. (*Dall.*)

Off Cuba, 200 fms.

Margarita (Turcicula) imperialis DALL, Bull. M. C. Z. ix, p. 42; xviii, p. 376.

T. BAIRDII *Dall.*

A species of this group from the Pacific, off Lower California in 400 fms., was dredged by the Albatross. It is 50 mill. high, 42 wide; is covered with a delicate green epidermis which erodes like that of a fresh-water shell, and exhibits a nearly circular aperture, with a somewhat reflected lip and brilliantly pearly throat. There is no callous across the body, nor any umbilicus. The shell bears a singular resemblance to a very large thin greenish *Vivipara* or *Tulotoma*. (*Dall*, in 'Blake' Rep., Gasterop., p. 377.)

T. (?) CIDARIS (A. Adams) Cpr.

This species may belong to or near *Turcicula*. I have no information save the original description; no figures have been published.

Testa magna, conica, Turcicoidea, tenui; albido-cinerea, nacreo-argentata; anfr. nucleosis —? (decollatis), norm. vii, subplanatis, suturis alte inculptis; superficie spiræ tota valide tuberculosa, seriebus tribus, alteris postea intercalantibus; periphæria et basi rotundatis, carinatis; carinis circ. 8, haud acutis, irregularibus, scabris, haud tuberculosis; lacuna umbilicali vix conspicua; apertura subrotundata; labro tenuissimo; labio obsoleto; columella arcuata. Long. 1.1, long. spir. .65, lat. .75, div. 60°. (*Carpenter.*)

Neeah Bay, Washington Territory. (Swan.)

Margarita cidaris (Ad.) CARPENTER, Ann. and Mag. N. H. xiv (3d ser.), p. 426, 1864.

Genus CALLIOSTOMA Swainson, 1840.

Calliostoma SWAINSON, Shells and Shellfish, p. 351, Type, *Tr. conulus* L.—*Ziziphinus* GRAY, Syn. Brit. Mus. 1840 (no description), type, *T. ziziphinus*.—*Ziziphinus* or *Zizyphinus* Leach, of authors.—*Conulus* NARDO, 1840, type *T. ziziphinus* (not *Conulus* Fitz., 1833).—*Lischkeia* FISCHER, Sp. et Icon. Coq. Viv., Trochus, p. 419, 1880, type, *T. monilifera* Lam.—*Eucasta* DALL, 'Blake' Gasterop., 369, 1889, type *C. indiana* Dall.—*Jujubinus* MONTEROSATO, Nom. Gen. e Spec., p. 46, 1884, type *Tr. matonii* Payr.,=*exasperatus* L.—*Jacinthinus* MONTS., type *T. conulus*, Bull. Soc. Mal. Ital. xiv, p. 79, 1889.—*Manotrochus* FISCHER, Manuel, p. 827, 1885, type *C. unidentatum* Phil.

Calliostoma is one of the largest genera of Trochidae. The species inhabit all seas, ranging from 0 to 500 fms. depth. The shell is generally conical, with angular periphery; columella simple above, not folded, and either simply concave below or slightly truncate and toothed (*Calliostoma* s. s. and *Eutrochus*), or cylindrical, strongly plicate (*Tureica*). The axis is solid except in *Eutrochus*. The operculum is thin, circular, corneous, many-whorled. The radula has the rhachidian and 4 to 5 lateral teeth with irregularly oval body, and rather long, pointed cusps, their outer edges serrate; uncini numerous, narrow, with narrow serrate cusps. Uncini numerous, narrow, with narrow serrate cusps. The inner uncinial tooth is large and of a peculiar form in the typical species. *C. millegranus* as figured by Sars, has a radula much like *Gibbula*, quite different from the ordinary *Calliostoma*. Friele, Sars, Hutton and Troschel have figured radulae of this genus.

The name *Ziziphinus* Leach has been used for this genus by most European authors. It was not defined by Gray (who rescued the name from Leach's ms.), and besides is objectionable on account of being a duplication of the name of the typical species. As Dall remarks, there seems to be no reason except the natural perversity of human nature, why *Ziziphinus* should be preferred to *Calliostoma*. The notes on sculpture development under *Euchelus* should be consulted, as they apply largely to the present genus also.

C. SPECTABILIS A. Adams. Pl. 16, fig. 12.

Shell large, conical, solid, imperforate, flesh-colored or yellowish, dotted with pink on the spiral ribs; surface spirally ribbed, the ribs coarsely granose, numbering about 7 on the penultimate whorl, some

of them small; on the base there are about 8 concentric ridges, scarcely beaded except the two or three inner ones; spire conical, much broader than usual in *Calliostoma*; sutures slightly impressed; whorls about 6, nearly flat, the last obtusely angled at the periphery; base rather flattened. Aperture rounded quadrangular, very similar in shape to that of *C. punctulatum*, nacreous, iridescent and sulcate within; columella pearly, arcuate. Alt. 35, diam. 37 mill.

Auckland; Chatham Is.

Ziziphinus spectabilis A. AD., P. Z. S. 1864, p. 37, t. 27, f. 7.—REEVE, Conch. Icon., f. 5.—HUTTON, Proc. Linn. Soc. N. S. W. ix, p. 360, 1884.

This species has a more robust heavy spire than any other allied form. The sculpture is coarse.

C. TIGRIS Martyn. Vol. X, Pl. 41, fig. 30.

Shell large, conical, imperforate, solid but rather thin, light yellowish, longitudinally painted with numerous rather narrow irregular chestnut-reddish stripes. Surface of embryonic whorls smooth, the others encircled by numerous delicate, finely beaded lirulæ, which on the penultimate whorl number about 16–20; on the upper surface of the body-whorl there are 18–25. The spire is elevated, its lateral outlines concave above; sutures a little impressed. Whorls 10–12, those of the spire flattened, the last convex, rounded at the periphery. The aperture is rhomboidal, iridescent within; columella arcuate, pearly, bluntly tuberculate at base.

Alt. 59, diam. 58 mill.; alt. 45, diam. 45 mill.

Auckland to Cook's Sts., N. Zealand; Chatham Is.

Trochus tigris MARTYN, Univ. Conch. ii, t. 75 (1784).—GMEL. Syst. Nat. xiii, p. 3585.—PHILIPPI, Conchyl. Cab., p. 50, t. 10, f. 16, 17.—*Ziziphinus tigris* Mart. REEVE, Conch. Icon., f. 4.—*Granatum*, CHEMNITZ, Conchyl. Cab., v, p. 100, f. 1654, 1655.—*Trochus granatum* LAM., An. s. Vert. ix, p. 145.—CHENU, Manuel, f. 2551.—FISCHER, Coq. Viv., p. 69, t. 15, f. 1.—*Ziziphinus granatum* Chemn., HUTTON, Proc. Linn. Soc. N. S. W. ix, p. 360, 1884.

This tawny striped trochus, well named Tiger Trochus, differs from the other species in its coloration. The periphery is less angular than that of *selectum*, but not so rounded as in *C. punctulatum*. The granulation is fine and even, not obsolete on the outer part of the base. The name proposed by Chemnitz is not binomial, and cannot be adopted in preference to Martyn's.

C. PUNCTULATUM Martyn. Pl. 65, fig. 75.

Shell conoidal, imperforate, solid, yellowish or light fawn-colored, unicolorous or dotted on the spirals with dark brown; the granules often white by rubbing of the cuticle. Surface covered with narrow spiral closely and conspicuously beaded ridges, numbering 8-12 on the penultimate whorl, sometimes equal in size, sometimes alternately larger and smaller; on the next earlier (antepenultimate) whorl there are about 7, and still earlier whorls have 3 beaded carinæ; the interstices are obliquely striate. The spire is a little concave in outline toward the apex; apex acute, minute; sutures impressed. Whorls about 8 or 9, convex, the last rounded at the periphery. Aperture oblique, rhomboidal, pearly within, and showing folds in the macre corresponding with the liræ outside; columella arcuate, pearly, not tubercled below. Alt. 36, diam. 36 mill.

Cook's Straits to Dunedin, New Zealand.

Trochus punctulatus MARTYN, Univ. Conch., t. 36 (1784).—REEVE, Conch. Icon. xiii, f. 95.—*T. diaphanus* GMEIN., Syst. Nat., xiii, p. 3580.—QUOY et GAIMARD, Voy. de la Astrol., iii, p. 254, t. 64, f. 1-5.—WOOD, Index Test. t. 29, f. 99.—PHILIPPI, Conchyl. Cab., p. 8.—FISCHER, Coq. Viv., *genre Turbo*, p. 43, t. 10, f. 2.—*Turbo diaphanus* LAM., An. s. Vert., vii, p. 45.—*Trochus asper ex rubicundo et albido granulatus, etc.*, CHEMNITZ, Conchyl. Cab., v, p. 26, t. 161, f. 1520, 1521.—*Turbo grandineus* VALENCIENNES, Voy. de la Vénus, atlas, t. 4, f. 4.—KIENER, Icon. Coq. Viv., *Turbo*, t. 10, f. 2.

The present species is very similar at first sight to *Turbo (Modelia) granosus* Martyn; that species however is shorter in the spire, has a broader columella, and generally more separated rows of granules. The latter, in this form, vary considerably in degree of coarseness. The spire is shorter than in the following species, which is, however, very closely allied.

C. PELLUCIDUM Valenciennes. Vol. X, Pl. 41, fig. 36.

Shell conical, imperforate, solid, yellowish with a few brown obliquely longitudinal streaks, and closely minutely dotted with brown and white on the numerous closely beaded liræ which encircle the whorls. These liræ number about 8-10 on the penultimate whorl, and the same number on the last above the periphery, but owing to the frequent intercalation of lirulæ between them, the number is subject to variation. Just at or just below the periphery

there is a group of lirulæ, closer, smaller than those of the upper surface; the rest of the base is regularly granose-lirate. The spire is longer and more elevated than in *C. punctulatum*, and more concave in outline; the apex is acute; sutures very slightly impressed; whorls about 9, flattened, the last subangular at the periphery; aperture rhomboidal, iridescent inside, columellar margin arcuate, with a slight tubercle at base. Alt. 30, diam. 30 mill.

New Zealand.

T. pellucidus VAL., Voy. de la Vénus, Moll., t. 4, f. 2, 1846.—FISCHER, Coq. Viv., p. 70, t. 15, f. 2.—*Ziziphinus granatus* Chemn. REEVE, Conch. Icon., f. 2 (not *Tr. granatum* Chemn., = *C. tigris* Mart.)

More convex on the base than *C. speciosum*, less rounded on periphery, with longer spire than *C. punctulatum*; very similar to *C. tigris*, but differently colored, more carinated, with fewer series of granules.

■

C. SELECTUM Chemnitz. Pl. 65, figs. 73, 74, 78.

Shell large, conical, imperforate, solid, but rather thin, very pale fawn-color, almost white, with elongated brown dots on the spiral riblets. Upper surface with numerous delicate spiral closely granulose riblets, numbering about 10 or 11 on the penultimate whorl, more numerous on the upper surface of the last whorl because interstitial lirulæ are intercalated; on the antepenultimate there are 5, and on earlier whorls 3 granose liræ; on the base there are distinctly granose concentric liræ in the middle, but toward the periphery the liræ become smaller, narrower, less distinctly grained. The spire is conical, its lateral outlines concave on the upper part; apex acute; sutures scarcely discernable until the last whorl is reached. Whorls 8-9, flat, the last slightly convex above, obtusely angular at the periphery, somewhat convex beneath. Aperture subrhomboidal, oblique, pearly and iridescent within, the naere showing by folds the positions of the principal liræ of the outside; columella arcuate, oblique, pearly, basal and outer lips crenulated at the edge.

Alt. 50, diam. 57 mill.; alt. 37, diam. 47 mill.

New Zealand.

Trochus selectus CHEMNITZ, Conchyl. Cab. xi, p. 168, t. 196, f. 1896, 1897 (1795).—KIENER, Sp. et Icon. Coq. Viv., *Trochus*, t. 39, f. 1.—PHILIPPI, Conchyl. Cab., p. 261, t. 28, f. 12.—? *Ziziphinus selectus* Chem. REEVE, Conch. Icon., f. 1.—*Z. selectus* Chem. HUTTON,

Proc. Linn. Soc. N. S. W. ix, p. 359, 1884.—*Tr. Cunninghami* GRAY in Griffith's Cuvier's Animal Kingdom, xii, t. 1, f. 7 (1834).—PHIL., Conchyl. Cab., p. 281, t. 41, f. 7.—FISCHER, Coq. Viv., p. 119, t. 39, f. 1.—*Ziziphinus cunninghami* Gray, REEVE, Conch. Icon., f. 6.—*Z. articulatus* REEVE, Conch. Icon., f. 3.—*Z. decarinatus* "Perry," HUTTON, Proc. Linn. Soc. N. S. W. ix, p. 359 (not *T. decarinatus* Perry!).—*Trochus torquatus* Anton, PHIL., Conch. Cab., p. 261, t. 28, f. 13.

The typical *selectus* is a shell smaller than the dimensions given above, dotted above and below, and somewhat obscurely maculated below the suture and at the periphery. *Z. articulatus* of Reeve is this form. The *T. cunninghami* is a much larger shell when fully developed, and has no color markings beneath. When not fully developed it is *very broad and flat beneath*. These forms seem to belong to a single species; I cannot separate the shells before me or the published figures into two series; there are too many intermediate forms. *Tr. decarinatus* of Perry is an unknown species, perhaps the same as *C. canaliculatum* Mart., but certainly not allied to *T. cunninghami* or *selectum*.

C. MEYERI Philippi. Vol. X, pl. 41, fig. 35.

Shell strictly conical, carinated, imperforate, thin but rather solid, very pale yellowish or pinkish, with irregular, rather pale vertical bands of light yellowish-brown, often broken into maculations, and radiating on the base. The surface is shining, with numerous spiral granose liræ, 7 in number on the penultimate, the antepenultimate, and the upper surface of the last whorl; and sometimes these three whorls (or the last one) show interstitial threads between the granose liræ; the flat base has 12 or 13 concentric liræ, the several inner ones stronger, decidedly beaded, the 3 or 4 outer more separated, less beaded; the angular periphery is formed of a double beaded ridge, and on some specimens this projects a little at the sutures of the spire. The spire is conic, elevated, with straight lateral outlines; whorls 9; apex subacute, smooth; the two earlier whorls following the apical are tri-lirate; the last whorl is angular at periphery, flat beneath, indented in the center around the insertion of the columella. Aperture rhomboidal, oblique, angled on the outer part, *above* the angle *thickened inside by a heavy callous or pearly submarginal deposit*; columella oblique, arcuate, a trifle toothed at base.

Alt. 36, diam. 34 mill.

Australia; Tasmania.

T. meyeri PHILL., Zeitschr. f. Mal. 1848, p. 101; Conchyl. Cab., p. 279, t. 41, f. 4.—FISCHER, Coq. Viv., p. 76, t. 17, f. 2.—*Tr. armillatus* Wood, KIENER, Spec. et Icon., t. 17, f. 2 (not *armillatus* Wood).—*Ziziphinus armillatus* Wood, REEVE, Conch. Icon., f. 19.—*Tr. levis* HOMBR. et JACQ., Voy. au Pole Sud, t. 14, f. 17, 18 (not *T. lævis* Wood, or Chemn.).

The straightly conical form, flat base, indented around the axis, and the details of sculpture, easily separate this from allied forms.

C. STEPHANEPHORUM Watson. Pl. 16, figs. 1, 1a.

Shell high, conical, tubercularly carinate and lirate, ruddy, with a coronated apex, glossy smoothish flatly conical whitish base, and large quadrangular mouth. Sculpture: longitudinals—the whole surface is obliquely scored with broadish well-parted little-raised rounded striae on the lines of growth, on the base these are feebler and less regular. Spirals: on each whorl there are about 7 strongish equal threads, which are somewhat sparsely dotted with low flat tubercles, whose greatest breadth is in the height of the shell; each whorl round its base is keeled by a stronger prominent triangularly acute substellately tubercled thread; above this lies another thread a little stronger and more prominent than the normal spiral threads above; between these two stronger threads is a small shallow furrow, which is perpendicularly (not obliquely) striate; round the base and within the carinated periphery is another obtuse angled tubercled keel; on the base are some 18 or 20 flattened threads; toward the rim these are very feeble and are not very distinguishable from the 2 or 3 weaker threads which occupy the wide intervals between; towards the middle space of the base the stronger threads become more marked and also faintly tubercled, the interstitial ones tend to disappear; close into the pillar, however, some very faint threads again appear in the interstices. Color pale ruddy, with some suffused deeper spots, and flecked on the tubercles with rich bright chestnut. Spire conical, with straight profile lines. Apex rather large, blunt, and coronated by the prominence of the carinal tubercles; it is rather strongly radiatingly striated; the extreme tip is very minute and is immersed; it is rough, not polished or glossy. Whorls in all 9, of very regular but somewhat rapid increase; they are flatly conical, being neither convex nor concave; the last is largish, and is very sharply angulated at the periphery. Suture linear, and only recognizable from the projecting keel above it. Mouth largish, quadrangular. Outer lip thin, flat on the side and

on the base, acutely angled at the periphery. Pillar is broken in front, but seems short; it is encompassed with a pad of nacre and has a twist on it; there is no approach to an umbilicus.

Alt. 1, diam. 0.95 inch. (*Watson.*)

Philippines, in 102 fms.

Trochus (Ziziphinus) stephanephorus WATSON, Challenger Rep. Gasterop., p. 58, t. 17, f. 1.

In general character this is like *Trochus meyeri* Phil. but that shell is in color brown, and the stains are arranged in narrow divergent lines, not, as here, in ruddy stains affecting especially the tips of the tubercles. In that species, the whole whorl swells out below the suture, not, as here, the mere thread, nor in that species are the tubercles there any larger than elsewhere. The threads on the sides are fewer, and their tubercles are larger; on the base the threads are much coarser and more strongly tubercled; the entire apex is dark colored, and is smaller and smoother. (*Watson.*)

C. TRANQUEBARICUM Pfeiffer. Pl. 17, figs. 17, 18.

Shell conical, imperforate, solid, very pale colored, almost white, minutely tessellated on the ribs with light brown, the periphery with larger spots of the same. Surface finely spirally striate, the striæ about 8 on the last whorl, with a couple of stronger ribs at the periphery, which are visible above the suture on the spire whorls. Spire short, conic, acute, its lateral outlines rectilinear; whorls 7-8, flat, the last acutely carinated, flat beneath; aperture oblique, rhomboidal, smooth and nacreous within; columella short, arcuate, obliquely truncate at base.

Alt. 14, diam. 18; alt. 13, diam. 19 mill.

Northern shores of the Indian Ocean; Tranquebar; Pondicherry; Vizagapatam.

Tr. tranquebaricus L. PFEIFFER, Krit. Regist. zu Mar. Conch. Cab., p. viii, no. 5.—PHILIPPI, Conchyl. Cab., p. 65, t. 13, f. 10.—FISCHER Coq. Viv., p. 308, t. 98, f. 1.—*Ziziphinus tranquebaricus* Chemn., RVE., Conch. Icon., f. 15.

Easily known by the low-conical form, finely sculptured flat whorls, edged at periphery and sutures by a pair of strong liræ.

C. CILIARIS Menke. Pl. 67, figs. 40, 41.

Shell pyramidal, imperforate, fulvous, with red spots along the suture, transversely striate, decussated by very delicate striæ; base plane;

whorls flat, margined below, ciliate-fimbriate above; aperture ovate-lanceolate, lip callous-margined inside. (*Menke.*)

West coast of Australia.

T. ciliaris MKE., Moll. Nov. Holl. spec., p. 17.—PHILIPPI Abbild., ii, Trochus t. 7, f. 11; Conchyl. Cab., p. 102, t. 17, f. 1.

Reeve's figure alleged to be *ciliaris* seems to be different. The specimen described and figured by Philippi was sent to him by Menke. The whorls, according to Philippi, are flat, finely plicate on their upper margins, margined on the lower, grooved with about 7 impressed transverse lines, the interspaces, cut by the striae of growth, here and there appear as if flatly grained. The upper whorls have separated knobs on the margins; the margin of the last whorl is acutely angular, the base flat, a little excavated in the center, with concentric impressed lines, becoming closer toward the periphery.

Alt. 25, diam. 31 mill.

C. CASTRA Reeve. Pl. 16, fig. 4.

Shell broadly conoid, depressed, sharp-angled, rather thin, whorls flatly sloping, spirally linearly engraved, obliquely plicately crenulated below the sutures, corded at the basal margin; pale flesh-color, obscurely tessellated and reticulated. (*Reeve.*)

Chiefly remarkable for its light, broadly depressed form and almost total absence of sculpture. (*Reeve.*)

Swan River, Australia.

Zizyphinus castra, REEVE, Conch. Icon., xiv, f. 14 (1863).

C. HALIARCHUS Melvill.

Shell erectly conical, pyramidal, the last whorl acutely angled at base; whorls plane, sloping, nearly smooth, encircled by delicate lire, with little granules, two in the vicinity of the suture larger, decorated with larger grains; yellow, ornamented with purplish-brown flames at the periphery, obscurely punctulate; lire of base nearly smooth, dotted, base plane, subconvex; columella callous, fauces smoothly striate. Alt. 40, diam. 36 mill. (*Melvill.*)

Australia?

Zizyphinus haliarchus Melvill, Journ. of Conch., Leeds, vi, p. 32 (1889).

May prove close to *C. cunninghami* Gray.

C. SOWERBYI Pilsbry. Pl. 18, fig. 17.

Shell acutely sub-elevated conic, thin, brownish-flesh-color, spirally encircled by minute, interrupted close brown lines, banded with ashen toward the apex; whorls 10, scarcely convex, the earlier granose-lirate, succeeding smooth, the last at the suture subconspicuously granose-lirate, the liræ becoming then almost obsolete; suture impressed, margin obtusely carinated, ornamented with sub-distant reddish spots; base plano-convex; aperture obliquely quadrate, throat pearly; columella callous, oblique, scarcely incurved. Alt. 30, diam. 33 mill. (*Sowb.*)

Japan.

Z. jucundus SOWB., P. Z. S. 1878, p. 798, t. 48, f. 6 (not *T. jucundus* Gould, also a *Calliostoma*).

I can add no information to the above.

C. ORNATUM Lamarek. Pl. 16, fig. 3.

Shell conical, imperforate, rather solid but not thick, pale yellowish, with radiating brown flames above, the base dotted with brown and whitish. Surface of whorls encircled by spiral liræ, uneven in size, and cut into very close compressed granules; there are about 10 such liræ on the penultimate whorl, but the number is variable owing to the greater or less development of interstitial riblets; the base has 10-13 concentric riblets, which have a tendency to split or become double; they are wider than the interstitial furrows. The spire is elevated, conical; the apex acute; sutures slightly impressed. Whorls about 7, slightly convex. There are generally two or three stronger liræ near the middle or periphery, and this gives at times a slightly bicarinate outline to the body-whorl; base flattened, a little convex; aperture subrhomboidal, smooth inside; columella arcuate, often bounded by a purple streak.

Alt. 20, diam. 22 mill.; alt. 18, diam. 20 mill.

Cape of Good Hope; Torres Sts., N. Australia.

Tr. ornatus LAM., An. s. Vert. vii, p. 27.—DELESSERT, Recuil, t. 35, f. 3.—PHILIPPI, Conchyl. Cab., p. 208, t. 31, f. 1, 2.—KRAUSS, Sudaf. Moll., p. 98.—FISCHER, Coq. Viv., p. 75, t. 17, f. 1.—*Ziziphinus ornatus* Lam. RVE., Conch. Icon., f. 7.—CHENU, Manuel, f. 2664.—*Tr. fulvus* PHILIPPI, Conchyl. Cab., p. 209, t. 31, f. 3.

Resembles somewhat the subbiangulate, lirate Chinese species of *Calliostoma*. The sculpture though variable is characteristic.

C. BICINGULATUM Lamarek. Vol. X, Pl. 41, fig. 29.

Shell imperforate, acute-conical, pale yellowish or brownish, maculated with white; whorls 7 to 8, the embryonic smooth, following radiately heavily striate; separated by impressed sutures; whorls depressed above, spirally cingulate; cinguli 4, the upper 2 minute, lower 2 more prominent, with profound intersices; last whorl bicingulate in the middle, a little convex beneath, and encircled by about 12 concentric liræ, white and reddish articulated. Aperture rhomboidal; columella oblique.

Alt. 15, diam. 17 mill. (*Fischer.*)

Cape of Good Hope.

Tr. bicingulatus LAM., An. s. Vert. vii, p. 27.—DELESSERT, Rec. de Coquilles, t. 35, f. 1.—PHILIPPI, Conchyl. Cab., p. 87, t. 15, f. 8.—FISCHER, Coq. Viv., p. 198, t. 64, f. 2.—*Tr. vinctus* PHIL., Abbild., i, Trochus t. 1, f. 8.—(?) *Zizyphinus bicingulatus* Lam., REEVE, Conch. Icon., f. 20.

C. UNICUM Dunker. Pl. 16, figs. 10, 5.

Shell conical, solid, imperforate, brownish-yellow, with chestnut maculations above, and a brown-articulated peripheral girdle, the base generally not marked. Surface of the whorls encircled by numerous unequal liræ, slightly crenulated by regular incremental lines, liræ about 9 in number on the penultimate whorl, 12–14 on the base; spire rather short, low; apex acute, red or purplish; whorls 7, slightly convex, with a more or less obvious angle or carina in the middle of the upper surface; the last whorl subangular or rounded at the periphery, convex beneath. Aperture oblique, rhomboidal, the lip very much thickened within; columella oblique, concave above, cylindrical, with a groove marking the place of the umbilicus.

Alt. 20, diam. 21 mill.; alt. 17, diam. 18 mill.

Nagasaki, Decima, and Simoda, Japan.

Trochus unicus DUNKER, Mal. Blätt., 1860, p. 238; Moll. Jap., p. 23, t. 3, f. 3.—LISCHKE, Jap. Meeres Conchyl., iii, p. 64.—FISCHER, Coq. Viv., p. 338, t. 105, f. 2.—*Calliostoma affinis* DALL, Amer. Journ. Conch., vii, p. 125, t. 15, f. 14.—*Zizyphinus unicus* Dkr., REEVE, Conch. Icon., f. 8.

May be recognized by the numerous low riblets, very obsoletely bicarinated form, very thick lip, etc. The *C. affinis* of Dall (fig. 5) is the same as Dunker's typical form of *unicum*, figured in Mollusca

Japonica. Lischke (*loc. cit.*), has been over this ground exhaustively.

C. CECILLEI Philippi. Pl. 67, fig. 64.

Shell conical, imperforate, thin, transversely striate-granulate; whitish, marbled and flamed with brown. Whorls angulated in the middle, sculptured with two granose striæ above and below the angle, alternating with smooth ones; periphery angular; base *convex*; closely concentrically striate; aperture rhombic-rounded; columella arcuate, cylindrical, simple. (*Phil.*)

The shell is thin, conical, imperforate, and consists of 8 whorls. These are carinate in the middle, above and below the carina sloping; the last is separated from the *convex base* by a keel. The carina of the whorls is granose; above and below it are 2 to 3 granulose lines, alternating with elevated smooth ones. The base shows 15 to 20 compressed, elevated concentric lines, smooth except for quite visible incremental lines. Aperture quadrangular, with rounded corners; outer lip thin, sulcate on the edge; the columella oblique, cylindrical, arched, passing gradually into the basal lip. The color is yellowish or brownish-white, with dark reddish-brown spots, showing a blackish point at the carina.

Alt. 20, diam. 21 mill. (*Phil.*)

Formosa.

Trochus cecillei PHIL., Zeitschr. f. Mal., 1849, p. 151; Conchyl. Cab., p. 291, t. 43, f. 2.

Evidently closely allied to the preceding species, and to *C. multiliratum* Sowb.

C. MULTILIRATUM Sowerby. Pl. 15, figs. 45, 46.

Shell conical, imperforate, thin but solid, pale yellowish-gray, radiately flamed with reddish, base minutely dotted with reddish on the liræ. Surface of whorls encircled by unequal sized granose liræ, the granules not compressed, bead-like; there are about 7 such liræ on the penultimate whorl, and several minute ones intercalated toward the periphery; on the base there are about 15 liræ of nearly equal size, the inner ones granulose, the outer several nearly or quite smooth. The spire is conical, apex acute, apical whorl smooth, earlier whorls each with 3 strong smooth carinæ; sutures impressed; whorls 7, convex, the last rounded and obscurely biangulate at the periphery. Aperture rounded, broader than high, iridescent inside; columella arcuate, a little excavated in the umbilical region.

Alt. 16, diam. $17\frac{1}{2}$ mill.; alt. 17, diam. 18 mill. Aperture, meas. inside, 9 mill. wide, 9 high.

Cape of Good Hope (Sowerby); *China*.

Z. multiliratus SOWB., P. Z. S. 1875, p. 127, t. 24, f. 10.

Sometimes the liræ of the upper surface are not perceptibly granose except those near the suture. The species differs in details of granulation from *C. ornatum* Lam., and belongs nearer to several Chinese species. The locality given by Sowerby should be confirmed.

C. HUNGERFORDI Sowerby. Pl. 34, fig. 11.

Shell conical, imperforate, gray, with a blue tinge, sparsely spotted with brown, the apex blackish-brown, base with three series of brown dots. Spire rather acute; whorls 7, separated by an impressed suture, convex, obtusely angulated, striated, spirally irregularly lirate, upper liræ minutely granulated; last whorl obscurely biangulate, convex on the base, densely spirally lirate, decussated by striæ. Aperture obliquely subquadrate; columella slightly oblique, pearly. Operculum thin, corneous, multispiral, concave outside.

Alt. 24, diam. 25 mill. (*Sowb.*)

Var. β . Shell tawny, obscurely streaked with white and brown.

Alt. 29, diam. 28 mill. (*Sowb.*)

Japan.

Allied to *Trochilus* [*sic*] *unicus* Dkr. and *Trochilus consors* Lke., but differing from both in form and sculpture. The species, like *T. unicus* seems to vary considerably in color. Only one specimen of each of the two varieties is at present known. (*Sowb.*)

Calliostoma hungerfordi SOWB., P. Z. S. 1888, p. 568, t. 28, f. 14.

C. INCONSPICUUM Philippi. Pl. 18, fig. 18.

Shell small, solid, imperforate, conical, granose, whitish; whorls plane, separated by a profound suture, the last rounded-angular; base plane; granose cinguli 5 on the upper part of the whorl, 8-9 on the base; aperture depressed, broader than high; columella oblique, cylindrical, confluent with the basal lip. (*Phil.*)

The shell is very thick, considering its small size, exactly conical, and consists as usual of 7 to 8 whorls. These are completely flat, the last somewhat impressed below the suture, at the periphery rounded-angular. The base is flat. The suture appears much deeper than it really is, on account of the proximity of the granose ridges. These number 5 above, the 6th being covered at the suture. The base has 8-9 weaker granose liræ. The interstices upon the

last whorl here and there show granlose riblets. The aperture is almost twice as broad as high, and elliptical. The cylindrical columella passes gradually into the blunt thick outer lip. The color is brownish-white, perhaps bleached. Alt. $9\frac{1}{2}$ mill., diam. the same. (*Phil.*)

Habitat unknown.

Tr. inconspicuus PHIL., Zeitschr. f. Mal. 1849, p. 158; Conchyl. Cab., p. 296, t. 43, f. 12.

C. NUBILIS Philippi. Pl. 18, fig. 22.

Shell conical, imperforate, granulate, painted with broad purplish maculations and narrower white streaks; base purplish, concentrically sculptured with about 10 elevated, granulate lines; whorls subangulate below the middle, the last rounded at the circumference; penultimate whorl with 7, last with about 9 granulose cinguli; aperture subrhomboidal, coarctate; columella very oblique, entire. (*Phil.*)

The shell consists of 7 to 8 whorls, of which the upper are quite flat, the rest angled below the middle, the penultimate divided from the last by a notable constriction; the last whorl is rather rounded at the circumference, flat on the base. On the third whorl I count 6 granose liræ, on the following 7, separated by an elevated interstitial line; and on the last whorl 9. The base has 10-12 granose concentric ridges. The aperture is pretty rhomboidal, seeming to be narrowed by the thick peristome, and has a very oblique entire columella. Large purple spots, darker, almost black at their front edges, are separated by narrower white streaks; the apex is blackish, the base dark flesh-color, with a few girdles of brown dots.

Alt. 8, diam. 8 mill. (*Phil.*)

Habitat unknown.

Tr. nubilus PHIL., Zeitschr. f. Mal., p. 110, 1848; Conchyl. Cab., p. 255, t. 38, f. 2.

Very close to, or synonymous with, *C. jucundum* Gould, described in 1849.

C. ARRUENSIS Watson. Pl. 17, figs. 27, 27a.

Shell conical, carinated, flat on the base, strong, opaque, covered with tubercles, and colored with gray and pink. Sculpture: there are eight spiral rows of small round tubercles on each whorl. The tubercles on the first two rows, are larger than the others; these, as well as the next three rows, are parted by distinct depressions; the

lowest three rows are much closer together, but project a little, especially the center and largest row of the three. On the base there are about nine less strongly tuberculated spiral threads with feebler threads between, these intermediate threads becoming feebler towards the center. The tubercles are smooth and polished, but the whole intervening surface is sharply fretted with fine oblique puckerings. Color white, beautifully flecked above with grayish-purple patches, and closely spotted with purplish-pink on the base. Spire high and sharp pointed, its concavely conical slope being slightly broken at the sutures by the projection of the two superior rows of tubercles. Whorls about 10, flat and of very regular increase. Suture slight, but distinct, being defined by the slight carinal spiral above, and the double row of large tubercles below. Mouth rather small, square, and very oblique. Outer lip sharp but strong. Inner lip strengthened internally by a buttress of porcelaneous nacre, which ends abruptly towards the point of the pillar, forming a tooth. The pillar, beveled off to a sharp edge, is pressed back on the umbilicus, which it completely closes, leaving only a central depression and a post-columellar furrow. Operculum thin, yellow, normal.

Alt. .64, diam. .58 inch. (Watson.)

This species very much resembles *Trochus decoratus*, Phil., but that species is more highly narrowly conical, is flatter on the base, and the whole system of spirals is different. In *Trochus decoratus* also the earlier whorls are simply spiralled; here the spirals are cross-hatched. *Trochus nobilis*, Phil., is much larger, is flatter on the base, and is not so closely spiralled. *Trochus euglyptus*, Ad., has the whorls much rounder. (Watson.)

Arrou Is., S. W. of Papua.

Trochus (Ziziphinus) arruensis WATSON, Journ. Linn. Soc. London, vol. 15, p. 91; Challenger Report, Gasteropoda, p. 57, t. 6, f. 5.

C. TRANSENNA Watson. Pl. 17, fig. 28.

Shell small, conical, high, carinated, inflated on the base, thin, sculptured, yellowish with small ruddy spots. Sculpture: spirals—close to the suture is a row of disconnected beads, between this and the carina are three rows of appressed beads, of which the highest is the weakest; these four rows are parted from one another by furrows, each of which is a little broader than the thread above it; the carina also consists of a row of appressed beads; it is stronger than the other beads both in breadth and height, and the furrow above it is a little broader and deeper than the rest. On the base

are seven rows of appressed beads of nearly equal width and distance from one another; the first joins the outer lip, the central row twines up the pillar. These rows of beads make their appearance on the second whorl, and on all the upper whorls more than on the body-whorl; the carina is sharply expressed by a constriction above and below it. Longitudinals—the whole surface is crossed obliquely by not quite contiguous threads, which are almost as strong as the spirals. Between the threads are narrow, deep, long pits; each alternate thread is crowned by a bead at the suture. Color: the surface is dull and rough, yellowish, sparsely spotted on the spirals with a ruddy brown, which is almost crimson on the infra-sutural beads. Spire high and conical, the whorls being barely rounded. Apex small but flattened, the embryonic $1\frac{1}{2}$ whorls scarcely projecting. Whorls 7, of regular increase, almost flat, the body-whorl alone being slightly convex, rounded, and carinated at the periphery and tumid on the base, in the center of which is a most minute umbilical chink. Suture deeply and squarely impressed below the carina. Mouth slightly oblique, squarish, nacreous. Outer lip very thin, very slightly descending, and drawn in a little horizontally at its junction with the body, and then well rounded in its whole sweep to the point of the pillar-lip, near which it is externally crenulated by the ends of the basal threads. Pillar is short, straight, slightly tubercled on its inner side, hardly toothed in front, and still less angulated at its junction with the outer lip. The pillar-lip is very thin, slightly excavated longitudinally, and reverted on the minute umbilicus, which it almost wholly conceals. Behind it is a very narrow furrow.

Alt. .27; diam. .22 inch. (*Watson*.)

Philippines, in 82 fms.

Trochus (Ziziphinus) transenna, WATSON, Journ. Linn. Soc. London, vol. 14, p. 698; Challenger Rep. Gasterop., p. 62, t. 6, f. 3.

In form and details of sculpture this species is extremely like *Trochus (Thalotia) elisa*, Gould, from island of Capul, in the Philippines (British Museum), but is very obviously different. (*Watson*.)

C. ARGENTEONITENS Lischke. Pl. 63, figs. 32.

Shell imperforate, conoidal, apex acute, thin, yellowish, beautifully iridescent, the underlying nacre shining through; whorls 8, a little convex, obsoletely sculptured with incremental striae; suture with a

series of fine short folds on each side; three last whorls with a median series of tubercles; aperture almost half the entire altitude; last whorl encircled by an acute compressed carina at the base; base very convex, with 8 narrow crenulated spiral liræ, the first 3 separated, the rest closer; aperture rounded-subquadrate; columella sinuous, brilliantly pearly. Alt. 43, diam. 30 mill. (*Lischke*.)

Jedo, Japan.

Trochus argenteo-nitens LISCHKE, Jap. Meeres-Conchyl. iii, p. 66, t. 4, f. 1, 1874.

A handsome and distinct species.

C. CONSORS Lischke. Pl. 63, figs. 22, 23.

Shell broadly conical, apex acute, imperforate, rather thin, encircled by very many narrow, unequal, subtly granulose or crenulated riblets, as wide or narrower than the interspaces; pale tawny, flamed with deeper color, and articulated on the riblets with dark dots; whorls 8, separated by a suture not profound, margined, acutely angled in the middle; last whorl wide, furnished with another angle on the base; base convex, multi-lirate; aperture rhomboid-orbicular; columella arcuate, pearly, bordered outside by a semilunar pit; throat obsoletely sulcated, nearly smooth.

Alt. 25, diam. 24 mill. (*Lischke*.)

Jedo, Japan.

Trochus consors LISCHKE, Jap. Meeres-Conchyl., p. 65, t. 4, f. 2, 3, 1874.

C. MONILIFERUM Lamarek. Pl. 63, fig. 17.

The typical form of this shell is known to me only by the figures cited below. Fischer repeats Lamarek's diagnosis. The *T. alvina* of Lischke (pl. 63, figs. 15, 16) differs somewhat in the contour of the columella. The following description is translated from Lischke's:

Shell broad conic, oblique, apex acute, rather thin, whitish, with a silvery sheen from the underlying pearly layer; whorls 8, nearly flat, encircled by very numerous very finely granose riblets, and in the middle by a series of equidistant tubercles; the suture has a series of numerous little tubercles close above it, and beneath it a row of short oblique folds; last whorl equaling about two-fifths the total altitude, sub-bicarinated by two series of tubercles; base scarcely convex, sculptured by numerous granose spiral riblets, cut by incremental striae; umbilicus narrow, nearly covered by a plate-like dilation of the columella, and bounded outside by a porcelain-white

fasciole, the latter separated from the rest of the base by a furrow, and a second furrow runs spirally into the umbilicus. The concave columella passes gradually into the basal lip. The aperture is very oblique, is oval-rounded, rather widened; the throat shows lines corresponding to the outer sculpture, and is beautifully pearly.

Alt. 37, diam. 36 mill. (*Lischke*.)

Ins. Kiushiu, Japan.

Tr. moniliferus LAM., Encyc. Méth., p. 445, fig. 2; An. s. Vert. vii, p. 26.—FISCHER, Coq. Viv., p. 73, t. 16, f. 2 (not *T. monilifer* Lam., nor *T. moniliferus* Phil.).—*Tr. alwinæ* LISCHKE Mal. Blätt. xviii, p. 149, 1871; Jap. Meeres-Conchyl. ii, p. 84, t. 6, f. 17-19; Dkr., Ind. Moll. Mar. Jap., p. 259.

This shell is the type of Fischer's section *Lischkeia*.

C. AUSTRALIS Broderip, Pl. 18, fig. 23.

Shell, conical, granulate cingulate, with a larger supra-sutural cingulus, buff or nearly white, painted with spots of reddish or violaceous; whorls plane; base flat, imperforate, throat silvery. (*Brod.*)

Australia.

Tr. australis BROD., Zool. Journ. v, p. 331, tab. suppl. 49, f. 3. 1830 (not *T. (Monodonta) australis* Lam.)—*Tr. broderipi* PHILIPPI. Conchyl. Cab., p. 257, t. 38, f. 5.

Compared by Philippi (who had not seen the shell) with *T. gemmosus* Rve. and *nobilis* Phil. In outline the figure resembles *T. (Odontotrochus) chlorostomus* Mke., but that shell has a strong tooth at the base of columella.

C. FRAGUM Philippi. Pl. 18, figs. 13, 14.

Shell conical, subperforate, pale purplish-brown, painted with whitish stripes, with 4 distant series of granules; whorls 8, basal margins of the whorls prominent, granulate; interstices very delicately obliquely striate; base little convex, sculptured with 8 flat subgranose concentric liræ, each one divided by a furrow into two parts, alternating with narrow elevated lines; aperture rhomboidal, smooth, columella but little oblique, subtruncate at base.

Alt. 14, diam. 12 mill. (*Phil.*)

Habitat unknown.

Tr. fragum PHIL., Zeitschr. f. Mal. 1848, p. 106; Conchyl. Cab., p. 257, t. 38, f. 4.—*Zizyphinus fragum* Phil., RVE, Conch. Icon., f. 47.

May be a *Thalotia*, allied to *T. pyrgos*, one of Philippi's own species.

C. DECORATA Philippi. Pl. 66, fig. 31.

Shell turreted-conical, imperforate, brownish-ashen; whorls 9, nearly plane, with an elevated cingulus above and below, cut into granules by impressed longitudinal and transverse lines, encircled by three series of granules on a reddish-brown ground, the granules alternately white and black; the interstices have one or two elevated lines. Angle of the last whorl rounded, base pretty convex, with about 8 elevated weakly granulated concentric lines, the granules alternately whitish and dark brown. Columella somewhat oblique, subtruncate at base, obviously separated from the basal lip by a sinus. Alt. 20, diam. 15 mill. (*Phil.*)

Port Jackson and Brisbane, Australia.

Tr. decoratus PHIL., Zeitschr. f. Mal. 1846, p. 102; Conchyl. Cab., p. 59, t. 13, f. 1.—*Ziziphinus decoratus* Phil. REEVE, Conch. Icon., f. 28.—ANGAS, P. Z. S. 1877, p. 188.—*Tr. (Zizyphinus) decoratus* Phil., WATSON, Challenger Gasterop., p. 54.—*Tr. (Calliostoma) decoratus* E. A. SMITH, Zool. Coll. H. M. S. 'Alert,' p. 73.

Smith says: The interior of the aperture of this species, close to the outer and basal margin, is thickened with a whitish and more or less cloudy pearly deposit, which conceals to some extent the beautiful iridescence observable further within.

C. NOBILIS Philippi. Pl. 15, figs. 47, 48, 49.

Shell imperforate, acutely conical, rather thin; whorls 10, plane, the first eroded, smooth, following whitish buff, radiately flamed with brown and reddish, spirally cingulate, cinguli 6, granose, the upper 5 small, separated by equal interstices, lower cingulus wider, more prominent, suberenate; last whorl acutely carinated; base concentrically encircled by about 7–8 granose cinguli, alternately buff and rose colored; aperture subquadrate; lip plicate; columella subarcuate, base subnodose, with a parallel groove.

Alt. 22, diam. 22 mill. (*Fischer.*)

Australian coasts; Swan River; St. Vincent's Gulf, Darnley Id., Torres Sts., 25 fms.

T. nobilis PHILIPPI Conchyl. Cab., p. 86, t. 15, f. 6, t. 38, f. 1.—FISCHER Coq. Viv., p. 309, t. 98, f. 2.—*Ziziphinus nobilis* Phil. REEVE, Conch. Icon., f. 10.—BRAZIER, Proc. Linn. Soc. N. S. Wales, ii, p. 44, 1878.—*Tr. rubiginosus* VALENCIENNES, Voy. de la Vénus,

t. 4, f. 1.—*Z. splendidus* Phil. REEVE, Conch. Icon., f. 11.—*Tr. splendidus* PHILIPPI, olim, see Conchyl. Cab., p. 255.

Reeve's figure of the form called *splendidus* by Philippi, but afterward said by him to be a var. of *nobilis*, is given on pl. 15, fig. 49.

C. POUPINELI Montrouzier. Pl. 17, fig. 41.

Shell imperforate, elevated-conical, apex acute, ornamented all over with close obliquely grained spiral riblets, 2 supra marginal riblets stronger; shining, subcrystalline, fleshy-white, marked by remote reddish dots on the supra sutural rib. Whorls 8, separated by impressed sutures, subconcave above, a little tumid and very obtusely subearinated below, the base plano-convex. Aperture oblique, subrhomboidal, throat pearly and sulcate inside, brilliantly nacreous, the pearl not attaining to the edge of the lip, which is sharp and finely crenulated; columellar margin thick, subvertical, with a small tubercle. Alt. 12, diam. 8 mill. (*Fischer*.)

New Caledonia.

T. (Ziziphinus) poupineli MONTROUZIER Journ. de Conchyl. 1875, p. 40, t. 4, f. 6.—FISCHER, l. c., p. 49, and 1878, p. 210; Coq. Viv., p. 387, t. 116, f. 3.—*Z. comptus* AD. P. Z. S. 1854, p. 38.—REEVE, Conch. Icon., f. 48 (not *T. comptus* Phil., also a *Calliostoma*).

I follow Fischer in rejecting the name *comptus* on account of its essential identity with *comtus* of Philippi.

C. LEGRANDI Tenison-Woods. Pl. 66, fig. 23.

Shell straightly conical, imperforate, solid, rather thick, yellowish-flesh-color; sculptured spirally with numerous smooth riblets, alternately larger and smaller, 8 or 9 on the penultimate whorl, about 14 on the base, some of the interstitial ones near the axis quite small, the outer ones subequal in size. Spire conic, its outlines straight; sutures scarcely visible except for a slightly wider cingulus above them. Whorls about 6, flat, the last angular, nearly flat beneath, shortly deflexed at aperture in the only specimen before me. Aperture rhomboidal, oblique, with a couple of prominent riblets inside the upper lip, basal lip thickened, columella straight or a trifle projecting in the middle.

Alt. 13, diam. 13 mill.; aperture (meas. inside) alt. 6, diam. 6 mill.

Chappell Id., Bass's St., Tasmania.

Ziziphinus legrandi TEN.-WOODS, Proc. & Rep., Roy. Soc. Tasmania, 1875, p. 154.

A small smooth-ribbed form, allied, according to Tenison-Woods to *Z. incertus* Rve.

C. INCERTUM Reeve. Pl. 17, fig. 37.

This reversed species is known to me only by Reeve's illustration (pl. V, fig. 28). The accompanying page of text is lacking in the copy of the Iconica in the Academy library.

C. ALLPORTI Tenison-Woods. Pl. 66, fig. 22.

Shell small, conical imperforate, solid, white, the 6 or 7 whorls encircled by series of granules, 6 in number on the penultimate and upper surface of last whorl, the beads distinct, rounded; base with about 10 scarcely granulous concentric liræ. Spire conic, its outlines straight; apex acute, suture linear; body-whorl angular at periphery, a little convex beneath; aperture quadrangular, with a couple of rather strong riblets inside the upper outer lip; basal lip thickened; columella very oblique, a trifle straightened in the middle, rounded. Alt. 7, diam. $6\frac{1}{2}$ mill.

Islands in Bass's Strait, Tasmania.

Ziziphinus allporti TEN.-WOODS, Proc. Roy. Soc. Tasm., 1875, p. 155.

My specimen described above is probably not fully adult. The whorl is a trifle deflexed at the aperture, as in *C. legrandi*; and like that shell, there are a pair of rather strong spiral line within the aperture, which are rather strong near the upper outer lip. Tenison-Woods describes his shells as having the whorls rather convex, periphery rounded, inter-liral spaces obliquely striate, aperture bidentate below, alt. 11, diam. 9 mill.,—characters lacking in my specimen, owing, probably to its immaturity and slightly worn condition.

C. JUCUNDUM Gould. Pl. 66, figs. 26, 27, 28.

Shell small, solid, low conical, composed of about six conical whorls, with a slight vertical portion at base; the whorls girdled with fine, uniform, beaded lines, the alternate ones being generally smaller, sometimes even not beaded, and the two basal ones surrounding the vertical portion being larger; base a little convex, similarly sculptured with about twelve concentric lines, gradually diminishing from the center to the circumference; the umbilical region color-

less, not perforated, and with a groove-like impression beside the columella; aperture rhomboidal-orbiculate; columella arcuate, smooth; lip simple; colors arranged in radiating flammules, alternately white, strawberry-red, and pale flesh-color, gradually shaded into each other; on the base the dark or light-red are distributed along the granules in a somewhat articulated manner; nacreous beneath. Alt. $9\frac{1}{2}$, diam. 10 mill. (*Gould.*)

Tr. jucundus GOULD, Proc. Bost. Soc. N. H. iii, p. 91, 1849; U. S. Expl. Exped., Moll., p. 177, f. 209.

The excellent description of Gould, given above, corresponds perfectly with a specimen before me. Hutton says that the locality New Zealand, given by Gould, is incorrect. The only shell I have seen is said to come from Rio Janeiro.

C. SPECIOSUM A. Adams. Pl. 16, fig. 2; pl. 67, fig. 42.

Shell pyramidal-conical, imperforate, flesh-colored, variegated and punctate with rufous; whorls plano-concave, sculptured with transverse subgranulate alternately smaller and larger liræ, the granules reddish-brown; last whorl obtusely angular; base concentrically grooved; umbilical region impressed, bounded by a rufous callous; aperture subquadrate; columella solid, subarcuate, scarcely truncate anteriorly; lip lirate within, the margin subangulate in the middle. (*Ad.*)

Moreton Bay; Port Curtis, Queensland, Australia, 7-11 fms.

Z. speciosus AD., P. Z. S. 1854, p. 38.—REEVE, Conch. Icon., f. 9a, b.—*T. (Calliostoma) speciosus* E. A. SMITH, Zool. Coll. H. M. S. 'Alert,' p. 71.

Closely allied to *C. meyeri* Phil. but less angular at periphery, and with an orange columellar streak. Smith (*loc. cit.*) says: In form this species approaches *T. comtus* Phil., which however, in addition to difference in color, does not possess the peculiar smooth orange-yellow callosity at the umbilical region, so characteristic of *T. speciosus*.

C. RIOENSIS Dall. Pl. 67, fig. 76.

Shell elevated-conical, imperforate, thin, flesh colored, with irregular yellowish longitudinal stripes on the upper whorls and small whitish spots on the periphery, the liræ of periphery and base articulated with rufous dots. Spire conic, high, its lateral outlines a trifle concave above; whorls 8, a little convex; sutures a little

impressed. Surface covered with narrow, closely beaded spiral liræ, alternately larger and smaller, the interstices showing rather strong lines of increment. There are 6 principal spirals on the last, the penultimate and next earlier whorls. The penult. and last whorls each have an intermediate smaller spiral in each interstice. There is a slightly larger spiral just above the periphery; and the peripheral carina is formed of a pair of contiguous riblets; the base is nearly flat, with 12 subequal concentric spirals, slightly beaded by the light lines of increment. Aperture rhombic, bluish, nacreous and lightly sulcate within; lip sharp; columella cylindrical, a little curved, its face pearly, ending below in a slight point.

Alt. 15, diam. $13\frac{1}{2}$ mill.

Off East Coast S. America, 0-20 fms.

C. rioensis DALL, Proc. U. S. Nat. Mus. 1889, t. xii, f. 5 (1890).

Closely allied to the shell herein described as *C. jucundum* Gould.

C. TINCTUM Watson. Pl. 16, figs. 11, 11a.

Shell small, conical, high spired, flatly rounded on the base, sculptured, creamy white, with faint chestnut specks. Sculpture: longitudinals—there are wrinkled lines of growth above, and on the base fine hair-like striae. Spirals—there are strong threads parted by slight furrows, 10 above the periphery on the last whorl, 6 on the penultimate whorl, between the second and third threads above the periphery a slightly broader and more distinct furrow occurs; all the threads are closely packed, with rather coarse round tubercles; the edge of the base is pretty sharply angulated; the angulation becomes blunt and rounded toward the mouth; on the base there are 10 flattish, somewhat, unequal untubercled threads parted by very shallow and narrow furrows, which become somewhat stronger toward the pillar. Color creamy, sparsely speckled with small pale chestnut-colored dots. Spire rather high, conical. Apex a little coarse, but small, consists of $1\frac{1}{2}$ embryonic whorls, of which the tip is red and elevated, somewhat coarsely but regularly honeycombed. Whorls $6\frac{1}{2}$, conical, with flattened slopes of slow regular increase; the last, which is not large, is angulated at the periphery, descends at the mouth, and has a flatly conical, slightly convex base. Suture small, but coarse, and a little impressed. Mouth very oblique, but with a perpendicular pillar; it is nearly square in form; there is very little nacre within. Outer lip thin; at its insertion it is a good deal drawn in on the base of the shell; it is patulous on the side,

but very little so on the base. Pillar lip is broad, strong, reverted, channelled, twisted, and bluntly angulated, patulous, but not toothed at its junction with the base.

Alt. .25, diam. .23 inch. (*Watson.*)

Off East Monœur Island, Bass' Straits, in 38 fms.

Trochus (Ziziphinus) tinctus WATSON, Challenger Rep., Gasterop., p. 63, t. 17, f. 2.

An inconspicuous but pretty little species, which, though small, seems quite full-grown. (*Watson.*)

C. COMTUM Philippi. Pl. 18, fig. 24.

Shell conical, imperforate, solid, granulate, flesh-colored, painted with radiating white streaks, the apex blackish-violet. Whorls little convex, the last rounded-angulate, above a little concave, superior whorls with 6 or 8 granulate cinguli, close, separated by a narrow granulate line; base granose-cingulate, principal cinguli about 8, alternating with smaller ones. Aperture rhomboidal, depressed; columella oblique, subtortuous, cylindrical. (*Phil.*)

The shell is very solid, quite exactly conical. The 3 last whorls are more strongly convex below, the last somewhat concave above; the uppermost are entirely flat; the basal angle is rounded; the base plane in a radial direction. The granules of the surface are hemispherical, closely crowded; on the third whorl I count 6 series of them, between them are much narrower granose lines, which become stronger and stronger until they attain the same prominence as the principal series. The sculpture of the base is the same. The aperture is depressed, rhomboidal, the outer lip superficially sulcate within, corresponding to the principal liræ of the outer surface. The columella is oblique, somewhat twisted, cylindrical, without tooth at base. It is flesh-colored, with white rays.

Alt. 17, diam. 18 mill. (*Philippi.*)

Habitat unknown.

Tr. comtus PHIL., Conchyl. Cab., t. 324, t. 46, f. 6.

C. TICAONICUM A. Adams. Pl. 1, fig. 4.

Shell elevated conical, perforate, buff or flesh-color, ornamented at the suture with liræ articulated with rufous; whorls little rounded, longitudinally striate, apex blackish-purple; last whorl subangular; base a little convex, sculptured with rufous-articulated cinguli;

aperture subquadrate; columella straight, subtruncated anteriorly; aperture white inside. (*Ad.*)

Island of Ticao, Philippines, 6 fms.

Z. ticaonicus AD., P. Z. S. 1851, p. 167.—REEVE, Conch. Icon., f. 43.

C. DECUSSATUM A. Adams. Pl. 17, fig. 33.

Shell elevated-conic, subperforate, whitish, ornamented with green longitudinal maculations; whorls plane, margined and a little prominent at the base; sculptured with granulate cinguli, decussated by elevated longitudinal lines; last whorl angulate, base a little convex, ornamented with granulate cinguli; aperture subquadrate; columella straight, truncate at base. (*Ad.*)

Calipan, Mindoro, 12 fms.

Z. decussatus AD., P. Z. S. 1851, p. 167.—REEVE, Conch. Icon., f. 65.

C. JAPONICUM A. Adams. Pl. 17, fig. 25.

Shell turreted-conic, smooth, shining, imperforate; whorls plane, with two impressed lines at base, the last angulate, red with white and yellow flammules, base convex, sculptured with articulated cinguli; aperture subquadrate, iridescent green inside. (*Ad.*)

Japan.

Z. japonicus AD., P. Z. S. 1851, p. 167.—REEVE, Conch. Icon., f. 49.

Compare *Cantharidus hilaris* Lischke, antea, p. 130.

C. UNICINCTUM A. Adams. Pl. 17, fig. 34.

Shell turreted conical, imperforate, buff; whorls plane, subimbricating, ornamented at base with slightly prominent cingulus articulated with red, and close transverse lines; last whorl angulate, base produced, sculptured with concentric lines and an elevated articulated cingulus; aperture subtrigonal, columella straight, subcanaliculate at base. (*Ad.*)

Lord Hoods Island, on pearl oysters, 8-10 fms.

Z. uncinetus AD., P. Z. S. 1851, p. 167.—REEVE, Conch. Icon., f. 58.

C. PICTURATUM A. Adams. Pl. 17, fig. 38.

Shell turreted-conical, imperforate, green or violaceous, ornamented with undulating bands and zigzag lines; whorls plane, basal margin crenulated, sculptured with transverse impressed lines; last whorl

angulated, the base a little convex; aperture subquadrate, white inside; columella incurved, base truncate. (*Ad.*)

Delaquete, Id. of Negros, 7 fms.

Z. picturatus A. AD., P. Z. S. 1851, p. 168.—REEVE, Conch. Icon., f. 53.

C. POLYCHROMA A. Adams. Pl. 17, fig. 31.

Shell turreted-conic, perforate, green, painted with undulating white bands, varied with buff angular lines; whorls plane, subimbricating; ornamented with a slightly prominent articulated margin, subdistant impressed transverse lines, and longitudinally substriate; last whorl angulate, base a little convex, sculptured with cinguli articulated with buff; aperture subquadrate, green inside; columella straight subtruncate at base. (*Ad.*)

Island of Masbate, 7 fms.

Z. polychroma AD. P. Z. S. 1851, p. 168.—REEVE, Conch. Icon., f. 40.—BRAZIER Proc. Linn. Soc. N. S. Wales ii, 1878, p. 45.

Brazier gives Cape York, N. Australia, 11 fms., as an additional locality.

C. DUPLICATUM A. Adams. Pl. 17, fig. 26.

Shell turreted-conic, imperforate; whorls convex, ornamented with granose cinguli, with two larger more prominent cinguli at base; interstices longitudinally striate; large whorl subrounded, base a little convex, sculptured with granose cinguli; aperture subrotund; lip lirate within; columella terminating in a tubercle at base. (*Ad.*)

Habitat unknown.

Zizyphinus duplicatus AD., P. Z. S. 1851, p. 168.—REEVE, Conch. Icon., f. 55.

C. ELEGANTULUM A. Adams. Pl. 66, fig. 29.

Shell conical, imperforate, buff; whorls plane, encircled by distant elevated violet beaded lines, alternately smaller, the interstices longitudinally striate; base nearly plane, ornamented with 4 violet cinguli; aperture subquadrate, white inside; columella subtruncate at base. (*Ad.*)

Malacca, 10 fms.

Z. elegantulus AD., P. Z. S. 1851, p. 167.—REEVE, Conch. Icon., f. 38.

C. ZEBUENSIS (A. Adams) Reeve. Pl. 15, fig. 44.

Shell stoutly conical, whitish, variegated with pale blue-green, whorls rounded, closely finely ridged throughout, minutely crenulated below the sutures, ridges smooth, rather sharp. The ridges of this little species are unusually fine and sharp, with no indications of granules. (Rve.)

Zebu, Philippines.

Z. zebuensis ("Adams MSS.") REEVE, Conch. Icon., f. 63 (1863).

C. GEMMOSUM Reeve. Pl. 15, fig. 40.

Shell rather tumidly conical, solid, whorls slopingly convex, densely strongly grained, here and there linearly engraved, lines obliquely minutely crenulated, basal margin obtusely rounded; golden straw-color, engraved lines chocolate-purple. Strongly grained upon a bright golden straw-color, enlaced with engraved lines of a deep chocolate-purple. (Rve.)

Puerto-Galero, Island of Mindanao, Philippines, 6 fms.

Tr. gemmosus REEVE, P. Z. S. 1842, p. 184; Conch. Syst. ii, p. 165, t. 218, f. 9; *Z. gemmosus* Conch. Icon., f. 23.

C. VEXILLUM Reeve. Pl. 15, fig. 43.

Shell conical, white, broadly striped with green, whorls rudely convex, smooth, spirally linearly engraved. A shell of simple form, with no sculpture excepting faintly engraved spiral lines. (Rve.)

Australia.

Z. vexillum RVE., Conch. Icon., f. 59 (1863).

C. SIMILARIS Reeve. Pl. 15, figs. 38, 39.

The text describing this species is missing in the copy of the Iconica accessible to me.

Palm Id., N. E. Australia, 8 fms.; Lizard Id., Torres Sts.

Z. similaris REEVE, Conch. Icon., f. 32a, b.—BRAZIER, Proc. Linn. Soc. N. S. Wales ii, p. 44 (1878).—*Trochus* (Ziz.) *similaris* Rve., WATSON, Challenger Gasterop., p. 55.

C. FLAMMIGER Dunker. Pl. 66, fig. 34.

Shell conical, solid, glabrous, yellowish-white, painted with undulating lines and flames of buff; whorls 10, plano-convex, separated by distinct sutures, the last obtusely angular at the circumference; base a little convex, unicolored buff, in the middle white, marked with a few umbilical sulci; aperture rounded-tetragonal. (Dkr.)

Habitat unknown.

T. flammiger DKR. P. Z. S., 1856, p. 355.—*Zizyphinus flammiger* DKR., REEVE, Conch. Icon., f. 52.

C. OCELLATUM Reeve. Pl. 17, fig. 23.

Shell rather broadly conical, reddish fulvous, ocellated with brown-shaded white spots; whorls concavely impressed round the upper parts, then rounded, spirally grain-ridged throughout. Rather constricted below the sutures, then rounded and ocellated with shaded opaque-white spots. (*Rve.*)

Habitat unknown.

Z. ocellatus RVE., Conch. Icon., f. 61 (1863).

Compare *C. jucundum* Gould.

C. INTERRUPTUM Wood. Pl. 17, figs. 21, 22.

Shell erectly conical, grayish-white, encircled by fine blue-black interrupted lines, minutely articulated at the sutures; whorls flatly sloping, spirally finely ridged, interstices minutely crenulately striate. A very distinct erectly-conical shell, painted in an elaborately tessellated manner. (*Reeve.*)

Habitat unknown.

Z. interruptus (Wood) REEVE, Conch. Icon., f. 64.—*Trochus interruptus* WOOD, Index test., Suppl., t. 6, f. 42.

The original figure of Wood is given on pl. 17, fig. 22. Fig. 21 is from Reeve, the only author who has identified the species.

C. SCOBINATUS (Adams) Reeve. Pl. 17, fig. 24.

The text to plate 5 of Reeve's monograph of *Zizyphinus* is lacking in the copy of the Iconica before me. I copy his figure (Icon., t. 5, f. 29) of this species. I do not know where Adams described it, if anywhere.

Darnley Id., Torres Sts., 12 fms. (Brazier).

Z. scobinatus (A. Ad.) REEVE, Conch. Icon., f. 29.—BRAZIER, Proc. Linn. Soc. N. S. Wales ii, p. 44, 1878.

C. MONILE Reeve. Pl. 17, fig. 32.

Shell erectly conical, rather swollen at the base, transparent white, encircled by a necklace of violet spots; whorls concavely sloping, spirally ridged, ridges smooth, the two basal ridges more prominent. The necklace of violet spots has an exceedingly pretty appearance on the delicate transparent ground of the shell. (*Rve.*)

Port Curtis; East Australia.

Z. monile REEVE, Conch. Icon., f. 39 (1863).

C. RUBROPUNCTATUM A. Adams. Pl. 66, fig. 30.

Shell small, orbiculate-conic, buffish; ornamented with transverse spinulose cinguli (4 on the last whorl), interstices clathrate, beautifully dotted with red. (*Ad.*)

Albany Id., N. Australia, 3-4 fms.; *Port Darwin, N. W. Australia*, 8-12 fms.

Z. rubropunctatus AD., P. Z. S. 1851, p. 167.—REEVE, *Conch. Icon.*, f. 56.—*Tr. (Calliostoma) rubropunctatus* AD., SMITH, *Zool. Coll. H. M. S. 'Alert,'* p. 72.

Smith (*loc. cit.*) writes as follows: This is a charming little species, and readily recognized by its peculiar painting and remarkable sculpture. Adams describes the color as "lutescens." I should rather consider it pale fleshy pink, with dark red dots in the interstices between the oblique costæ and the transverse or spiral ridges. The latter are said to be four in number on the last whorl; but on careful examination I find six, of which four are, however, more prominent than the rest. The upper volutions are encircled by three principal liræ, and a fourth secondary one at the suture. The points of intersection of these spiral ridges and the oblique costæ are produced into quite acute nodules or prickles. The base of the shell is almost flat, ornamented with about six concentric liræ, which are more or less granulous, with the interstices exhibiting strong lines of growth and translucent nacre. The color closely approaches the rest of the surface, varied with brown dots both upon and between the granules.

C. VENUSTUM Dunker. Pl. 67, fig. 72.

Shell of an elevated-conical form, narrow and slender, the lateral outlines of spire straight, the base convex, imperforate. It is strong, solid; ground color either olive-green or dark red, with narrow longitudinal stripes of white, the periphery of the last whorl sometimes articulated with white, and the base either unicolored dark, or finely dotted with white. Whorls 10, the apical one or two convex, smooth, the following flat, finely spirally striate (about 14 striae on the penult. whorl of a large specimen), the last whorl convex at the periphery, angulated there in specimens not completely adult, convex beneath, with 10-12 concentric lirulæ there. The entire surface has fine lines of growth; there is sometimes a slight tendency toward plication on the periphery of the last whorl. Aperture quadrangular, oblique, smooth inside; basal lip thickened by a straight callous

inside; columella short, vertical, arcuate above, terminating in a truncation or fold-like tooth. Alt. 13, diam. 7 mill.

Viti Islands.

Ziziphinus venustus DKR., Mal. Bl., xviii, p. 169, 1871.

This species has the greatest similarity to the Mediterranean *C. striatum* Linn. The columella is very strongly folded at the base; the color is either green or red; on one shell before me the spire is red, body-whorl greenish. In *pattern* of color the shells before me differ little. It is possible that some forms included by me in the group of *C. exasperatum* as synonymys may prove to be valid species of the south-west Pacific. Reeve and others report such forms (*Vide Tr. socia* Fischer; *goniostomus* Mke.). Without specimens from authentic localities this cannot now be decided. The specimens of *C. venustum* before me were collected by GARRETT.

C. MARMOREUM Pease. Pl. 39, fig. 33.

Shell elongate-conical, imperforate, but with a groove and pit or even a slight perforation at the place of the umbilicus; rather solid; whitish, longitudinally clouded with brown or pink, often showing white opaque scattered dots; surface polished; sculpture consisting of numerous broad flat smooth spirals, separated by impressed lines; there are seven of these flat spiral ribs on the upper surface of the last whorl, the peripheral one larger; the base has numerous concentric striae, and about 4 spaced, more impressed grooves; spire high, lateral outlines nearly straight; whorls about 8, each one a trifle convex, the last angular at the periphery; base a little convex; aperture quadrate; columella vertical, obliquely truncate at base.

Alt. 6, diam. 4 mill.; alt. 8, diam. 5 mill.

Paumotus.

Tr. marmoreus PSE., Amer. Journ. Conch. iii, p. 287, t. 24, f. 9.

This is a second Polynesian species of *Calliostoma* which approaches very closely to Mediterranean types. It is smaller than *C. venustum*, and less abruptly truncated at base of columella. The base of the aperture is not rounded, as the figure shows, but nearly straight.

American Species.

The West American species fall into three groups, as follows:

I. Shell with numerous smooth cord-like spiral riblets, group of *C. canaliculatum* Mart.

II. Shell thin, with numerous granulose spiral riblets, interstitial lirulæ few or none, group of *C. annulatum* Mart.

III Shell generally swollen or biangular at periphery, spiral striae and lirulae fine, more numerous, closely sharply beaded, group of *C. lima* Phil.

Species of the last group are also found in the Gulf of Mexico and on the east coast of South America, having the same distribution that *Chlorostoma* (*plus Omphalius*) has.

(Group of *C. canaliculatum* Martyn.)

✓ *C. CANALICULATUM* Martyn. Pl. 67, fig. 49; Vol. X, pl. 41, fig. 34.

Conical with flat base, thin, light fawn colored with yellowish-white lirae; imperforate; surface of the whorls encircled by numerous sharply sculptured smooth narrow, cord-like lirae, subequal or alternately smaller; base with 11 to 13 similar ones. On the upper whorls the lirae are fewer, and in well preserved individuals the second whorl is minutely beaded above. Spire conic, with nearly straight outlines; sutures impressed. Whorls 7-8, the last obtusely angular, flat beneath and impressed around the axis. Aperture oblique, rhombic, iridescent and sulcated inside; peristome thin, acute; columella straightened, not truncate below, dilated in a pearly iridescent pad above, bounded by an opaque white deposit.

Alt. 33, diam. 33 mill.

Sitka to San Diego, Cal.

Trochus canaliculatus MARTYN, Universal Conchologist, t. 32.—*Tr. doliarius* CHEMNITZ, Conchyl. Cab. x, p. 228, t. 165, f. 1579, 1580.—PHILIPPI, Conchyl. Cab., p. 11, t. 3, f. 1, 2.—FISCHER, Coq. Viv., p. 71, t. 16, f. 1.—*Ziziphinus canaliculatus* Mart., REEVE, Conch. Icon., f. 18.—*Calliostoma canaliculatum* Mart. of American authors.—(?) *Trochus decarinatus* PERRY, Conchology, pl. 47, f. 2.

In the case of this species, as in other similar cases, I have preferred Martyn's name to that of Chemnitz. Of course, as Fischer says (*Coquilles vivantes*, *Trochus*, p. 72), Martyn's work is simply an iconography, without descriptions; but the great beauty and accuracy of the figures renders identification easy and certain, and these qualities should surely receive the same recognition at our hands that we give to a three-line diagnosis, such as most early authors have given us. The principal objection to the work is the rarity of the original edition—an objection which applies equally to many early authors whose species are universally accepted.

Specimens from Vancouver are much smaller than southern shells, and have fewer spiral lirae, the alternate smaller ones being lost; the

interstices are chocolate colored. Figure 49 of pl. 67 represents one of these. From *C. costatum* this species may be known by its flatter whorls, more angular periphery, lighter color, etc.

C. COSTATUM Martyn. Pl. 16, figs. 6, 9; pl. 18, fig. 16.

Shell conical, rounded at periphery, base flattened; imperforate; solid; dark chestnut colored, the spiral riblets lighter, apex dark, usually purple. Surface encircled by numerous spiral smooth riblets, their interstices closely finely obliquely striate; riblets usually 7 to 9 on the penultimate whorl, about 9 on the base. Spire conic; apex acute; sutures impressed. Whorls about 7, convex, the last rounded (or a trifle angled) around the lower part, slightly convex beneath; aperture rounded, oblique, outer lip fluted within, with a beveled opaque white submargin; throat pearly, iridescent; columella simple, arcuate. Alt. 20, diam. 18 mill.

Sitka to Monterey and Sta. Barbara Id.

Trochus costatus MART., Univ. Conch., t. 34 (1784).—PHILIPPI Conchyl. Cab., p. 275, t. 40, f. 8 (not *Trochus costatus* Gmel. 1788, a form of *Lamprostoma*).—*Tr. filusus* WOOD, Index test. suppl., t. 5, f. 23 (no description).—FISCHER, Coq. Viv., p. 199, t. 64, f. 3.—*Zizyphinus filusus* WOOD, REEVE, Conch. Icon., f. 27.—*Tr. ligatus* GOULD, U. S. Expl. Exped., t. 12, f. 207.—*Tr. castaneus* (Nuttall ms) FORBES, P. Z. S. 1850, p. 271, t. 11, f. 9.—*Calliostoma costatum* of American authors.—*C. splendens* CARP., Proc. Cal. Acad. iii, p. 156 (*teste* Dall, Am. Jour. Conch. vii, p. 126).

A species very abundant along the northern Pacific coast; of its mutations Dr. Dall says: This species passes through a number of variations, which, however, do not obscure the specific characters. The ribs are usually yellowish, smooth with reddish-brown interspaces. The apex is blue when eroded. The whole sometimes has a more or less olivaceous cast. The yellow of the apical ribs is usually interrupted by patches of brown. This is sometimes continued on the lower whorls, when the three ribs nearest the suture and often one or two on the carina of the whorls are prettily painted with alternate patches of dark brown and greenish-white. The ribs are more or less prominent, some specimens having them quite sharp while in others they are hardly raised. In one other exquisite variety the three sutural ribs and their interspaces are of a very rich purple-blue, which is not due to erosion. The umbilical rib is sometimes salmon-colored. The nacre is of great brilliancy. Found from

Sitka to Santa Barbara and San Diego. Mr. Stearns and myself, after an examination of the type, were disposed to consider *C. splendens* C^{pr.}, as a very young specimen of the blue painted variety above alluded to.

(*Group of C. annulatum Mart.*)

C. ANNULATUM Martyn. Pl. 67, fig. 43.

Shell elevated-conic, imperforate, rather thin; light yellow, dotted with brown on the spiral rows of grains, the periphery or lower edge of each whorl encircled by a zone of violet or magenta, the axis surrounded by a tract of the same. Surface with numerous granose liræ, about 7 on the penultimate whorl, 9 or 10 on the base. Spire conical, apex acute, minute, reddish; sutures slightly impressed. Whorls about 9, slightly convex, the last angular at periphery, flattened beneath; aperture rhomboidal, oblique, fluted within.

Alt. 30, diam. 25 mill.

Sts. of Fuca to San Diego.

Trochus annulatus MART., Univ. Conch., t. 33 (1784).—PHILIPPI, Conchyl. Cab., p. 11, t. 3, f. 3-4.—FISCHER, Coq. Viv., p. 74, t. 16, f. 3.—*Zizyphinus annulatus* Mart., REEVE, Conch. Icon., f. — CHENU, Manuel, f. 2666.—*Tr. virgineus* CHEMNITZ, Conchyl. Cab. x, p. 165, f. 1581, 1582.—*Tr. moniliferus* "Lam." PHIL., Conchyl. Cab., p. 220, t. 33, f. 3 (not of Lamarek).—*Calliostoma annulatum* of American authors.

A lovely shell, the most beautiful of the West Coast Calliostomas. This, like the last two species, was one of these treasures which the famous Captain Cook first brought to Europe.

C. PLATINUM Dall. Pl. 67, fig. 84.

Shell conical, imperforate, very thin, nearly smooth, soiled white with a delicate tint of sea-green on the last whorl; surface slightly shining. The spire is conical, its outlines a trifle concave; whorls 8; apex subimmersed, dextral, the first two whorls quite convex, the following whorls slightly convex; sutures linear, last whorl with a delicate carina at the otherwise blunt periphery; above this, parallel with it, there is a narrow raised cord which does not extend above the lower whorl, and will probably be found to be quite inconstant: the whole upper surface of the whorls is traversed by numerous scarcely perceptible spirals; the base is slightly convex, and has close, unequal spiral striae, coarser near axis and circumference. Aperture rather large, subquadrate, beautifully iridescent

within; outer lip thin, fragile; columella vertical, cylindrical, pearly, not toothed at base. Alt. 30, diam. 27 mill.

Off Sta. Barbara Id., Cal., 414 fms.

Callistoma platinum DALL, Proc. U. S. Nat. Mus., 1889, t. vii, f. 2.

A lovely shell, very thin, white, with a faint tinge of "robin's egg" blue or green. It seems to group nearer *C. annulatum* than any other known species.

I am indebted to the extreme liberality of Dr. W. H. Dall for the privilege of including this species as well as *C. Rioënsis*, in my monograph, his own descriptions being still in print.

C. VARIEGATUM Carpenter.

Shell small, conical, variegated; nucleus rosaceous; whorls 6, planate; sutures hardly impressed; spire with 3 regular, nodulous riblets, the nodules whitish, subdistant; interstices very elegantly rosy; lirulæ of the base 8, scarcely nodulous, spotted with rosy.

Alt. .24, diam. .21 inch. (*Cpr.*)

Puget Sound.

Calliostoma (? var.) *variegatum* CARPENTER, Proc. Acad. Nat. Sci. Phil., 1865, p. 61.

'This may prove to be an extreme variety of *Cal. annulatum* Martyn.' (*Cpr.*)

I have not seen this form. Dr. Dall has expressed to me the opinion that it is a distinct species. The type is, I believe, still unique. Dr. Carpenter would have benefited science more by suppressing than by publishing those miserable descriptions of doubtful forms, some of which in spite of the long-continued labors of Dall, Stearns, Cooper and others, still defy identification except by a journey to where the types are deposited.

(*Group of C. lima Phil.*)

C. LIMA Philippi. Pl. 67, figs. 55, 56, 57, 58.

Conical, imperforate, quite solid and strong, whitish (tinged more or less with yellow or blue), with irregular, radiating, brownish or bluish-black maculations on the upper surface, the principal spiral liræ sparsely articulated with dark dots; frequently all color-marks are absent; the shell is then of a uniform cream color, with bluish or brown apex. There are about 8 whorls, the later ones concave above,

swollen at the circumference. The surface is covered with sharply granulose spiral threads; of these, three on the upper surface are slightly larger; midway between these lie two a trifle smaller; and the interspaces between these are occupied by still smaller beaded lines; on the base there are about 8 *principal* liræ, the interstices and outer portion being occupied by smaller lirule. The aperture is quite oblique, iridescent and slightly sulcate within; columella oblique, grayish, a little truncated or obtusely dentate at base.

Alt. 25, diam. 25 mill.; alt. 21, diam. 21 mill.

Panama; Acapulco.

Tr. lima PHIL., Zeitschr. f. Mal. 1849, p. 159; Conchyl. Cab., p. 310, t. 44, f. 15.—FISCHER Coq. Viv., p. 331, t. 103, f. 2.—*Zizyphinus antonii* KOCH, REEVE, Conch. Icon., f. 31.—*Calliostoma* (? *lima*, var.) *æquisculpta* CPR., P. Z. S. 1865, p. 279 (young shell).

This is a beautifully sculptured form. The 1st, 3d, 5th, 7th, 9th, and 11th liræ are very small; the 2d, 6th and 10th large; the 4th and 8th are intermediate in size. These figures are subject to some variation on account of the occasional interpolation of spiral threads, but they show at least what the *system* of the sculpture is. Several trays from Panama are before me. Fischer has with doubt identified the *T. antonii* Koch with this form. It seems to me to be distinct in showing fewer liræ, with plain, unsculptured inter-liral interstices, while this is never the case in *lima*, every space being occupied by spiral beaded threads, which increase in number, as the shell grows, by interpolation.

C. ANTONII (Koch) Philippi. Pl. 67, figs. 46, 47, 48.

Shell conical, solid, imperforate, dull flesh colored, granulate; whorls flat, encircled by 8 unequal series of granules, the *second largest*; base roughened by numerous granose cinguli. (*Phil.*)

The shell is thick, quite conical, and consists of 7–8 whorls, difficult to distinguish in the neighborhood of the apex. These are flat and apparently margined, for one is likely to take the second series of granules of the following whorl for a margin. The whorls show about 8 rows of very pretty granules of three sizes; the upper, 3d, 5th and 7th rows have the smallest granules, the 2d the largest; the 4th and 6th have middle sized granules. The periphery consists of several closely crowded rows of the smallest size, and is rounded on the lower whorls. The base is slightly convex, with a multitude of granulose series, the granules becoming larger near the center,

which is a semicircle, its chord being the columella, formed of inferior, gray nacre. The aperture is rhomboidal; the outer lip has a little distance within a brown streak. The color is dirty flesh color, with a few very pale brown clouds and fewer dark brown points. Alt. 18, diam. 23 mill. (*Phil.*)

Habitat unknown.

T. antonii Koch, PHILIPPI, Abbild. u. Beschreib. i, Trochus, t. 1, f. 4 (1843); Conchyl. Cab., p. 105, t. 17, f. 5.

This is certainly very close to *C. lima*. The name has several years priority. See remarks under that species.

C. MACANDREÆ Carpenter. Pl. 17, figs. 35, 36.

Shell subelevated, conical, whorls a little convex, suture distinct; red, maculated with paler; encircled by spiral nodose lines, 6 on the penultimate whorl, the lower two a little larger; interstices impressed, sometimes with intercalated lirulæ; tubercles close, rounded; periphery, slightly angulated; base ornamented with about 11 scarcely granulose liræ, interstices broad; columella scarcely excavated, a little twisted, umbilical region impressed. (*Cpr.*) Alt. 8.3, diam. 8.4 mill.

Var. Shell rufous-brown, with paler undulating waves; base red. Alt. 13, diam. 10½ mill.

Mazatlan (type); *Panama* (var.)

Shell somewhat resembling a variety of *T. antonii* Koch in Phil., which however has a few granular rows much larger than the rest, which are extremely fine and far apart. The whole upper surface in *T. macandreae* is covered with large tubercles. The base in *T. antonii* is sculptured like the rest of the shell, and the columella has a smooth scooped-out surface, which is wanting in this species. The Mazatlan specimen, perhaps immature, has 7 whorls. The variety from Panama has 9 whorls. (*Cpr.*)

Trochus MacAndreae CARP., Cat. Mazatlan Shells in Brit. Mus. (Reigen Coll.), p. 232, 1857.

C. EXIMIUM Reeve. Pl. 65, figs. 84-86. Vol. X, pl. 41, fig. 28.

Shell conical, imperforate, rather solid and strong, light yellowish or grayish, with irregular bluish-black longitudinal maculations and streaks, the base dotted or with small maculations; sometimes without dark flames, their place taken by obscure brownish clouding, the larger spiral cords both above and below articulated with deep red.

There are about 8 whorls, each one more or less markedly biangular at the circumference, the lower angle obtuse, concealed by the suture on the spire, the upper one acute, continuing nearly to the apex; whorls concave above, slightly excavated around the periphery, a little convex beneath; encircled by numerous unequal spiral threads, the larger ones beaded, the smaller irregularly crenated by rather decided incremental striæ. Base radiately striate, with about 8 to 12 smooth spirals, their interstices without secondary riblets. Aperture oblique, rhomboidal; columella heavy, smooth, its face concave, obtusely subdentate at base.

Alt. 24, diam. 23 mill.

Mazatlan; Cape St. Lucas; fossil in post tertiary at San Ignacio Lagoon.

Tr. versicolor, MENKE, Zeitschr f. Mal., 1850, p. 172.—CARPENTER, Mazatlan Cat., p. 231.—*T. eximius* REEVE, P. Z. S. 1842, p. 185; Conch. Syst. ii, p. 165, t. 208, f. 12.—*Zizyphinus eximius* REEVE, Conch. Icon., f. 25 (1863).—*T. eximius* Rve., PHILIPPI, Conchyl. Cab., p. 218, t. 32, f. 9.—FISCHER, Coq. Viv., p. 196, t. 64, f. 1; And of most American authors.—(?) *Zizyphinus Californicus* A. AD. P. Z. S. 1851, p. 168.—*T. ceratus* FISCHER, ms. Coq. Viv., p. 333.

Reeve gives Panama for locality. None of the shells before me come from south of Mazatlan. The species is more obviously bicarinate than *C. lima*, far less granulose, and with different base-sculpture. *C. palmeri* Dall is allied, but more granulose, with differently colored, more excavated columella.

C. ADSPERSUM (Beck) Philippi. Pl. 18, figs. 1, 2.

Shell conical, imperforate, whitish-gray, flammulate with rufous, *encircled by delicate granulate threads*; whorls plane, angulated a little above the sutures, the last biangulate; base a little convex, with 9 to 10 concentric, little elevated *smooth* liræ; aperture rhomboidal, angles rounded; columella oblique, cylindrical, subdentate at base. (*Phil.*)

The shell is pretty solid, exactly conical. The whorls are even, with a sharp carina close above the lower suture; the last whorl showing beneath this one a second rounded carina, bounding the base. The sculpture of the upper surface consists of fine thread-like or hair-like granulate spirals. I count five of them, the last forming the sharp carina over the suture; in the interstices there are finer granulose lines. The base shows smooth, little-raised concentric

liræ, nearly as broad as their interstices. The columella is bounded, by a pit at its insertion. The color is pale, with indistinct rust-brown flames, clouds and dots. Alt. 16, diam. 17 mill.

Brazil.

Zizyphinium adpersum BECK (in Roy. Mus. of Berlin).—*Trochus eximius* PHILIPPI, Abbild. i, Trochus, t. 4. f. 7 (not of Reeve).—*Tr. adpersus* Beck, PHIL., Conchyl. Cab., p. 217, t. 32, f. 8.

May be a synonym of *C. eximium*, but is more depressed than any specimen of that species I have ever seen.

C. PALMERI Dall.

Shell shaped like *C. eximium* Reeve, but rather more depressed, of seven whorls, glistening and polished, though sculptured with finely granulated, revolving lines. Upper whorls carinate and shouldered, last whorl bicarinate. Sculpture consisting above of about fifteen revolving, elevated, finely granulated lines, alternately spotted with light yellow, brown and white; basal surface with about eleven similarly colored ribs, which are not granulated, but have the interspaces slightly decussated by the lines of growth. Upper surface also painted with narrow waved white and broad livid patches, which are absent below. Umbilical region cobalt blue, or blue-purple, rather excavated, and bordered by a carina; mouth subquadrate, brightly pearly; columella arcuate, white; tooth-like process blue. Nucleus of two and a half whorls, flesh color, with revolving lines. (Dall.) Alt. 15, diam. 15 mill.

Guaymas, Mexico.

It is nearest to *eximium*, from which it is readily distinguished by the blue umbilical region and the different coloration of the revolving ribs, which in *eximium*, are much less prominent and are mostly colored with alternate purple, black and white instead of brown and white. The color and sculpture differs from that of *C. lima*, which is granulate on the base and wants the upper carina. (Dall.)

Calliostoma palmeri DALL, Am. Jour. Conch. vii, p. 125.

This pretty shell is evidently intermediate between *C. eximium* and *C. tricolor*, but as far as my material goes, seems to be distinct from both. I have copied Dr. Dall's description and comments.

C. GLORIOSUM Dall. Pl. 67, fig. 70.

Shell six-whorled, acute, whorls gently rounded, with fine, revolving, thread-like ribs; four or five ribs near the suture granulated. Last whorl roundly carinated, base flattened, with about twenty-five

revolving striae. Columella thick, not reflected, but base somewhat grooved or depressed behind it. Aperture about one-third of the length of the whole shell, rhomboidal, pearly, smooth. Shell of a beautiful light salmon color, ornamented near the suture and carina with alternate patches of light yellow and chestnut-brown. (Dall.)

Alt. 17, diam. 15 mill. (specimen); Alt 1.1, diam. .9 in. (Dall.)

Monterey Bay, California.

This elegant species was first referred by me to the *Calliostoma supragranosum*, of Carpenter, on account of the granulated sutural ribs. That species was described from very young shells, and no typical authentic specimens were at that time in California. Upon comparing the young of *gloriosum* with the type specimen of *supragranosum*, in the Smithsonian collection, it was at once evident that they were quite distinct. Several of the Californian species have the sutural ribs more or less granulated, especially in young specimens. The nucleus of *gloriosum* is, however, very much larger than that of *supragranosum*. The adult of the latter has five whorls. The whorls have a peculiar inflated appearance and are not carinated. The last whorl loses the painting of brown and white and is of a dull brown, slightly concave above near the suture, with a deep chink, not a fissure, behind the umbilical fissure. The brown and yellow painting is very conspicuous on young specimens of *gloriosum*.

Calliostoma gloriosum DALL, Amer. Jour. Conch., vii, p. 127.

The figure is drawn from a small but typical specimen loaned me by Dr. Dall.

C. SUPRAGRANOSUM Carpenter. Pl. 67, fig. 71.

Shell small, conical, rather thin, imperforate, light chestnut-brown with a few short subsutural white flames and a peripheral circle of alternating chestnut and white spots, the ribs of the base minutely articulated with chestnut and white. The spire is conical, short, composed of 5 convex whorls, the apical one *very minute*, smooth, whitish; the next 2 whorls are encircled by 2 strong, articulated ribs; on the next whorl these become beaded, and smaller beaded riblets appear above them; the last whorl has 4 (or 5) strong, elevated ribs around the middle, above them two or three beaded ribs; the base has 9 fine, distinct smooth concentric lirae. The last whorl is somewhat biangular at periphery, slightly convex beneath. Aperture nearly round, oblique; peristome thin,

a trifle crenulated inside; the columella has a slight excavation, and is very bluntly nodulous near the base; its inner face is dark, pearly. Alt. 5, diam. $5\frac{1}{2}$ mill.; alt. $7\frac{1}{2}$, diam. $7\frac{1}{2}$ mill.

San Pedro; San Diego; Catalina Id.; California.

C. formosum CPR., Proc. Cal. Acad. iii, p. 156 (not *T. formosus* Forbes).—*C. supragranosum* CPR., l. c., p. 214.

The above description is drawn from a typical specimen received from Dr. Dall. Two others, larger and more uniform in color are before me; one of them is figured on my plate. The shell never attains anything like the size of *C. gloriosum*.

C. LEANUM C. B. Adams. Pl. 57, fig. 50.

Shell conic, well elevated; pale yellowish or reddish-brown, with broad dark brown oblique flammules; anteriorly somewhat articulated with red and yellowish-white in fine concentric lines; with many elevated granulous spiral lines, of which three larger are next above the suture; spire with the outlines nearly rectilinear; apex acute; whorls nine, planulate or concave next below the suture, which is moderately impressed; last whorl subplanulate anteriorly; aperture subquadrate; labrum thin; columella obliquely produced, nearly straight; umbilicus wanting.

Alt. .48 in. Maj. diam. .44, min. diam. .4 in. (*C. B. Adams.*)

Panama.

Seven specimens were collected on the reef. We have named this pretty species in honor of Isaac Lea, Esq., of Philadelphia. (*C. B. Adams.*)

Trochus leanus C. B. ADAMS, Cat. Panama Shells, p. 191, 1852.

C. TRICOLOR Gabb. Pl. 67, fig. 52.

Shell conical, about the form of *C. lima*; rather solid; yellowish or olive-ashen, with three or four principal spirals above purple, articulated with white, 3 to 6 on the base similarly marked; often obscurely clouded above with dark brown or olive, often with white spots between the dark patches. Whorls about 7, obtusely biangulate at periphery, the superior angle prominent on the spire whorls; apex very minute, acute; surface cut into a finely densely granulated pattern by the decussation of numerous spiral striæ with close, regular, impressed lines of increment. Base slightly convex, encircled by numerous unequal liræ. Aperture oblique, subrhomboidal; columella arcuate, not at all truncate at base, its edge pearly, white,

backed by a curved purple streak, which is encircled by a band of bright light yellow. Alt. 16, diam. 16 mill.

Santa Cruz to San Diego.

Calliostoma tricolor GABB, Proc. Cal. Acad. Nat. Sci. iii, p. 186, 1865.

May be known by the finely granulated surface with a variable number of narrow spiral purple (or brownish) lines, articulated with white.

C. GEMMULATUM Carpenter. Pl. 67, fig. 54.

Shell conic-elevated, solid but rather thin, imperforate, greenish-olive, with narrow irregular longitudinal blackish-olive stripes. Whorls about 7, of a rounded form, separated by deep sutures, encircled by three principal granulose carinæ, the base and interstices with smaller lirulæ and regular incremental striæ; whorls of the spire with two strong carinæ. Base rather flattened, with about 10 concentric line, dotted with brown. Aperture rounded-quadrangular, iridescent; columella pearly, iridescent, not truncate below, bounded outside by a whitish-yellow streak. Alt. 17, diam. 14 mill.

San Ignacio Lagoon, L. Cal., to San Diego, San Pedro, etc., Cal.

C. gemmulatum CPR., Brit. Asso. Rep. 1863, pp. 612, 653; Proc. Cal. Acad. iii, p. 215.—*C. formosum* CPR., Proc. Cal. Acad. 1864, p. 155, (not of Forbes.)

A very distinct species. The spire is high, composed of strongly convex whorls, which are encircled by granose carinæ. The last whorl is more rounded at the periphery than is usual in *Calliostoma*.

C. FONKI Philippi. Pl. 57, fig. 48.

Shell conical, imperforate, thin, pale rose colored, upper whorls plane, tricingulate, the upper cingulus beaded, second and third smooth; last whorl obtusely angled, encircled by 5 cinguli; base a little convex, with 6 cinguli; aperture quadrangular: columella a little oblique, cylindrical, scarcely truncate, but sensibly passing into the base.

Alt. from apex to end of columella, 11, diam. of base $9\frac{1}{2}$ mill. (*Phil.*)

Between Chiloë and the mainland of Peru.

Trochus fonki PHIL., Reise durch die Wüste Atacama, p. 185, t. 7, f. 22.

Similar in sculpture to *C. consimilis* Smith, but with more convex, lirate base.

C. CONSIMILIS Smith. Pl. 16, fig. 8.

Shell pyramidal, of a very pretty purplish lilac color, encircled with pale transverse ridges. Whorls 7; the nuclear one rounded, white; the rest flat, with three to four strong spiral liræ, whereof the uppermost or the two uppermost, are more or less granulous. The interstices are smooth, with the exception of oblique lines of growth. Suture marked by a thread-like keel. Last whorl acutely angled below the middle, with a flattish base, which has two or three sulci near the angle, and two white or pale lilac liræ encircling the umbilical region. Aperture somewhat obliquely quadrangular; columella pearly, margined with a white callosity.

Alt. 11, diam. maj. 9, min. 8 mill. (*Smith.*)

Portland Bay, St. Andrews Sound, 10 fms.; Cockle Cove between tide-marks.

A very pretty species, easily recognized by its color and sculpture, and recalling to some extent the northern *C. albastrum*, Beck. (*Smith.*)

Trochus (Ziziphinus) consimilis E. A. SMITH, P. Z. S. 1881, p. 34, t. 4, f. 11.

C. COPPINGERI Smith. Pl. 67, fig. 75.

Shell thin, shortly conical, rather shining, and somewhat iridescent, owing to the thinness of the calcareous layer above the pearl; very pale olive on the body-whorl, becoming darker on the upper volutions and reddish at the apex, ornamented with a series of minute red dots at the upper part of the whorls, just beneath the suture, and a second series on an angle at the middle of them, with a third series around the periphery of the last volution, and some rather larger spots around the umbilical region. Whorls seven; the first three or four somewhat convex, with three coarse spiral liræ. Antepenultimate whorl flat, sloping above, with an acute angle a little above the base, spirally lirated; liræ little raised, with the exception of that at the angle and one immediately beneath the suture, which is very prettily beaded. Penultimate like the preceding, but with the sculpture less pronounced and the angle nearer the middle. Last whorl still more feebly sculptured, the beading having become obsolete. It is biangulated at the middle, and the space between the two angles is flat, giving the shell a very angular aspect. Base a little convex, concentrically striated, white at the middle, with a

conspicuous depression at the umbilical region, which is surrounded by three or four strong liræ. Lines of growth fine. Aperture oblique, irregularly pentagonal, smooth, and beautifully pearly. Columella arcuate above, obliquely straightish inferiorly.

Alt. 13, diam. maj. 14, min. 12 mill. (Smith.)

Off the mouth of the Rio de la Plata, 28 fms.

This beautiful shell is very distinct in form and character from any other in the genus. (Smith.)

Trochus (Ziziphinus) coppingeri E. A. SMITH, Ann. Mag. Nat. Hist., 5th ser. vi, p. 320 (1880).—*Calliostoma coppingeri* Smith, DALL, Proc. U. S. Nat. Mus. 1889, t. xii, f. 4.

I am indebted to Dr. Dall for the privilege of figuring a specimen of this species, taken by the 'Albatross' of the U. S. Fish Commission at the original locality, in 10 fms.

C. ROSEOLUM Dall. Pl. 49, figs. 35, 36.

Shell acute conical, eight-whorled; the first five whorls flattened, the last three somewhat rounded; periphery of last whorl gently rounded to meet the rather flattened base; umbilicus none; pillar short, straight, ending in a slight knob inside the margin of the aperture, which is then crenulated by the sculpture, nacreous, obliquely set and subrectangular in form; sutures appressed, hardly visible except in the last three whorls; color delicate rosy, nucleus smooth and white; the base with about twelve equal revolving ribs consisting of successive rounded nodules, of even size, somewhat like strings of beads; the first, third, and fifth ribs, counting from the pillar, show every third bead crimson, the others white; the other basal ribs have the rosy color of the shell, but in the seventh, ninth, and eleventh, each alternate or each third bead has a deeper crimson tint, though this is hardly visible without a glass. On the upper surface of the whorls are (eight in the last whorl) similar beaded ribs, several of which have rosy threads alternating with crimson ones; the general rosy hue is clouded darker and lighter alternately, but in an indefinite way. The sculpture of the whole shell is very uniform. Alt. $9\frac{1}{2}$, diam. 7 mill. (Dall.)

This is one of the early finds of Pourtalés, lost at Chicago, afterwards refund, and has been known to me for a good many years. It recalls *C. macandrewæ* from Panama in general form, and is one of a group of small species apparently hitherto undescribed which

have a considerable general resemblance to one another, and to some West American forms. (*Dall.*)

Near Havana, 37 fms.; *Sts. of Florida*, 200 fms.; *North Carolina to Yucatan*, 15–50 fms.

C. roseolum DALL, Bull. M. C. Z. ix, p. 45; 'Blake' Gasterop. p. 366, t. 24, f. 6.

This very pretty species marches with *Trochus pulcher* C. B. Ad. (not of A. Ad.), in distribution and general coloration. It differs from it in having rounded, not carinated whorls, in the full, not flattened base, in the absence of the two strong articulated spirals on the periphery, and in having the whorls excavated above instead of nearly flat. *C. roseolum* has no peripheral articulations of dark red and white or yellow, which are the most prominent features in good specimens of *C. pulcher*, the latter in this respect recalling *C. tampaënsis* Conrad. *C. roseolum* differs from *C. apicinum* in the absence of the liræ in the throat and the tooth-like process on the columella when adult. When young it has not the narrow chink behind the columella which is present in *C. apicinum*. The latter as far as observed is always pallid in color except at the apex. The nucleus is reversed. (*Dall.*)

C. EUGLYPTUM A. Adams. Pl. 15, fig. 37; pl. 57, fig. 9.

Shell conical, solid, imperforate; pinkish with darker flames above alternating with short white stripes or spots radiating from the sutures; spire rather straight conic; apex dark red; whorls 6, nearly flat, encircled by numerous narrow finely beaded liræ, the interstices on the lower whorl with minute beaded threads; there are about 7 principal liræ on the penultimate whorl, about the same number on the next earlier; the last whorl is bluntly angled; the base unicolorous pinkish, nearly flat, with about a dozen narrow beaded liræ. There is a small white tract around the axis. Aperture quadrate, silvery inside; outer lip slightly crenulate inside; columella oblique, cylindrical, a little swollen at base.

Alt. $16\frac{1}{2}$, diam. 17 mill.

Off Eastern coast of America, in 15–50 fms., from *North Carolina to Florida, Texas, and Vera Cruz, Mexico*. *Fossil in Florida Pliocene*.

Z. euglyptus A. AD., P. Z. S. 1854, p. 38.—REEVE, Conch. Icon., f. 17.—*Calliostoma euglyptum* A. AD., DALL, 'Blake' Gasteropoda, p. 363.

I am indebted to Mr. C. W. Johnson of the Wagner Free Institute of Science, Philadelphia, for specimens. Dr. Dall says :

This fine species varies in color from dark rose to yellowish-white, sometimes unicolor, sometimes variegated with whitish clouds radiating from the invariably purplish apex. It is referred by Reeve to Tasmania, in error. It is the commoner imperforate species of Florida, often collected by tourists, and is found in the Caloosahatchie marls. I have seen no specimens from the Antilles, nor have I seen it quoted by any author from the West Indies. It may probably exist in Cuba.

C. PULCHER C. B. Adams.

Shell conical, much elevated ; pale claret color, with a dark brown apex, and large ill-defined spots of white ; with spiral series of minute dark red oblong spots, which are proportioned to the size of the spiral ridges on which they are placed ; the ridges of least size are not spotted ; solid, with ten or twelve minute spiral ridges, of which one near the base of the whorls is larger, and three are of an intermediate size, viz., one on each side of the suture and one on the middle of the whorls ; on the lower side of the last whorl are sixteen or eighteen other minute revolving ridges, of which every second or third is spotted ; apex acute ; spire with the outlines nearly rectilinear ; whorls seven and one-half, a little concave, acutely prominent in the lower part ; last whorl subangular, moderately convex beneath ; aperture subquadrate, iridescent within ; columella subtruncate ; umbilicus wanting. The whorls in this shell have the same form as in *T. jujubinus*, and the general form of the shell is like that of *T. pyramidatus*.

Alt. .38 in. ; diam. .27 inch. (Adams.)

Jamaica.

Trochus pulcher C. B. ADAMS, Contributions to Conch., No. 5, p. 69, 1850.

(*Deep-water Gulf species.*)

C. BAIRDII Verrill & Smith. Pl. 57, figs. 49.

Shell large, strong, regularly conical, with a flattened base, no umbilicus, yellowish white or light yellow, with more or less numerous narrow, spiral bands of pale brown or dark brown, and with large squarish spots of bright rosey red on the spire. Whorls nine or ten, flattened, or concave, below the suture, which is not impressed. The last whorl has eight to ten conspicuous, raised, nodulous revolving

ribs, of which three or four are much smaller and alternate with the larger ones; the strongest rib is just below the suture; interstices concave, brownish, glossy, obliquely striated by the lines of growth, and sometimes with subordinate, revolving, raised lines. The four principal ribs are continued on the upper whorls, but the intermediate ones gradually disappear on the middle whorls. The nodules on the ribs are prominent, rounded and smooth, whitish, and extend to near the apex. Nuclear whorl smooth; next with three carinae. Base with about twelve spiral, nodulous ribs with some intermediate, smaller ones; umbilical region slightly excavated spirally. Columella strongly concave, terminating in an indistinct tooth. Animal yellowish with long tentacles, and with four long cirri on each side; eyes well developed. Dentition somewhat different from the typical species of the genus; there is no large lateral tooth, between the inner and outer series; outermost ones broad, flat, curved. Operculum, thin, circular, with many narrow whorls. (*Verrill and Smith.*) Alt. 22, diam. 30; diam. of aperture 15 mill.

Off Southeast coast of New England, 65 to 252 fms.; Florida, 100-200 fms.

Calliostoma bairdii VERRILL AND SMITH, *Am. Jour. Sci.*, xx (3d ser.), p. 396, 1880.—DALL, *Bull. M. C. Z.* ix, p. 45; Blake *Gasterop.*, p. 364.—*C. psyche* DALL, *Bull. M. C. Z.* v, p. 61 (not described).—*C. bairdii*, VERRILL, *Trans. Conn. Acad.* v, p. 530, t. 57, f. 26; *Rep. Albatross explorations in 1883* (Annual Rep. Commiss. Fish & Fisheries, 1883), pl. 27, f. 96, 97.

The name *psyche* Dall, may be used for the southern variety, which is paler and more delicately colored, less elevated, lateral outlines slightly concave.

C. CIRCUMCINCTUM Dall. Pl. 49, figs. 33, 34.

Shell solid, strong, white, elevated, conical, seven-whorled, nucleus polished, small delicately reticulate; other whorls with two sharp, much produced, thin keels a little recurved at their edges, and crossed only by most delicate lines of growth; base flattened, ornamented with nine angular ribs, the outermost produced somewhat; umbilicus none, aperture subrectangular, notched by the keels; pillar simple, somewhat projecting, at its anterior end not callous; suture appressed, distinct, not channelled.

Alt. 8, diam. 6 mill. (*Dall.*)

Yucatan Strait, 640 fms.

This somewhat resembles a *Calliostoma annulatum* in miniature, with the characters exaggerated and minus the coloration. It appears to have a dextral nucleus. (Dall.)

C. circumcinctum DALL, Bull. M. C. Z. ix, p. 44, 1881; 'Blake' Gasterop., p. 364, t. 22, f. 3, 3a.

C. ECHINATUM Dall. Pl. 49, figs. 40, 41.

Shell small, white, acute-conical, in general resembling *C. sapidum*, but less stout and solid and with wholly different sculpture; whorls six, somewhat appressed toward the apex; nucleus smooth, semi-transparent, inflated, shining, sinistral, subimmersed; remainder of shell opaque white with the following sculpture; on the upper whorls, four revolving ribs with smaller inconspicuous ones between them, crossed by faint plications (more evident on the smaller whorls), producing nodosities which on the four principal ribs, and especially on the third one, counting from the suture toward the base, rise to acutely pointed projections separated by an incurved scallop of about twice the width of the projections; toward the aperture the ribs and nodosities become more equal in size; base flattened, impervious, sculptured with some fifteen close-set flattened revolving ribs crossed by impressed radiating lines of growth; aperture nearly rectangular; pillar straight, stout, not projecting, without a callous; margin thin a little crenulated by the sculpture. Alt. $5\frac{1}{4}$, diam. $4\frac{3}{4}$ mill.

Off Havana, 80 fms.

C. echinatum DALL, Bull. M. C. Z. ix, p. 47, 1881; 'Blake' Gasterop., p. 364, t. 21, f. 2a, 5.

C. STIOPHORUM Watson. Pl. 17, fig. 19.

Shell small, conical, scalar, inflated on the base; whorls angulated, with three strong carinæ near the periphery, white over nacre. Sculpture: spirals—at the periphery is a sharp flange-like carina; above this, about one-third of the distance to the suture, is a second, almost equally strong and prominent, which forms a shoulder to the whorls. The space between this and the suture is divided pretty equally by two threads, the lower of which is feeble. On the upper whorls all of these are closely beaded, on the last whorl only the two highest are so. Below the carina is another remote strong thread, which meets the outer lip; within it is another, not quite so strong nor so distant, and occupying the space from this to the middle are five flat close-set threads, followed by three rather more separated and roughly beaded threads, the inner-

most of which, like a twisted cable, forms a sort of pillar with a chink between it and the sharp edge of the pillar-lip, and advances into a small tooth at the angle where it joins the outer lip on the base. Longitudinals—the whole surface is roughened by rather coarse oblique lines of growth, which on the upper whorls appear as oblique, reticulating ribs. Color white, with a translucent calcareous layer over nacre. Spire rather high, scalar. Apex a little flattened down and rounded, the minute rounded embryonic $1\frac{1}{2}$ whorls scarcely rising above the level. Whorls 6, of rather rapid increase, with a narrow flat shelf below the suture, thence sloping flatly to the shoulder-carina, from which point the contour-line descends perpendicularly; the base is inflated at the edge and flattened in the middle. Suture deeply impressed between the narrow flat shelf below and the over hanging carina above. Mouth slightly oblique, but with a perpendicular pillar, round, nacreous within. Outer lip thin, transparently porcelaneous on the edge, but thickened by nacre within. Pillar-lip perpendicular, rounded within the mouth, advancing to a sharp point in front, slightly reverted but not appressed, having a small open furrow and a minute umbilical chink behind it. (*Watson.*) Alt. .3 in., diam. .26 inch.

Off *Culebra Island, West Indies*, in 390 fms.

Trochus (Ziziphinus) stiroporus WATSON, 'Challenger' Gasterop. Rep., p. 59, t. 6, f. 2; Journ. Linn. Soc. London xiv, p. 695.

This species extremely resembles *Trochus occidentalis* Migh., but is smaller, is broader in proportion, with a less high spire; the apex is not sharp and projecting, but flattened down and rounded; the whorls are much more scalar, and of more rapid increase; the base is more tumid on its outer edge and more rounded. The apex is ornamented with a microscopic and quite irregular inlaid work of angular depressions, parted by very narrow interrupted raised lines; whereas in that species the ornamentation is like honeycomb, with relatively large, nearly regular hexagonal pits and raised flat borders. The threads on the base are approximate, not parted in the middle by a smooth zone, and the pillar-lip is not appressed as in that species; the outer lip, too, is thickened within by the layer of nacre. (*Watson.*)

C. SAPIDUM Dall. Pl. 49, figs. 38, 39.

This species bears a strong superficial resemblance to the last [*apicinum*] and is best described by a differential diagnosis; it is

entirely white, not colored, it has seven whorls in a shell of the same size as an *apicinum* with six; the sutures are slightly channelled, and therefore distinctly visible; there are four instead of nine beaded ribs on the upper side of the last whorl, and the beads are coarser, the interspaces wide enough to show the lines of growth crossing them; the nodules on the peripheral rib in this whorl are undulations rather than beads, and sufficiently large to give a crenulated appearance to the border of the shell when viewed from below; there are eight revolving ribs on the base crossed by fine ridges following the lines of growth; there is no umbilicus or callus; the pillar is not grooved or thickened; the aperture is more oblique and proportionately less wide. Alt. 5, diam. 4.12 mill. (*Dall.*)

Blake Station 2, 805 fms.

C. sapidum DALL, Bull. M. C. Z. ix, p. 46; 'Blake' Gasterop., p. 364, t. 21, f. 2, 4.

C. APICINUM Dall. Pl. 60, figs. 1, 2.

Shell conical, of six whorls, elevated, thin, rather solid; whorls and base flattened, the sutures hardly visible, the last whorl subangulated, but not carinated, on the periphery. Nucleus prominent, bubble-shaped, shining opaque white; second whorl deep rose-pink, with three longitudinal beaded ribs; rest of shell yellowish-white, with indistinct clouds of brown transversely disposed on the upper whorls; the lower rib on the second, third and part of the fourth whorls with somewhat larger beads than the rest, crowning the suture; the upper side of the last whorl with about nine revolving beaded ribs with a slight tendency to run in pairs, beginning at the periphery; base with eleven somewhat flattened ribs only the two next the pillar beaded, the others crossed by evident lines of growth, radiating in a wavy manner, umbilicus a hardly visible puncture; pillar grooved, hardly thickened, aperture not very oblique, crenulated (especially below) by the ends of the ribs, subrectangular.

Alt. $7\frac{1}{2}$, diam. 7 mill. (*Dall.*)

Barbados, 100 fms.; Off Havana, 175 fms.

C. apicinum DALL, Bull. M. C. Z. ix, p. 46; 'Blake' Gasterop., p. 366, t. 24, f. 3.

The examination of another specimen shows that this species covers the chink behind the pillar when adult, that there is a blunt knob suggesting *Thalotia* on the pillar, and that it has 8 or 9 strong liræ running into the throat and not connected with the outside

sculpture, the one nearest the pillar thickened and raised at its termination. The nucleus is sinistral. (*Dall.*)

C. TIARA Watson. Pl. 17, figs. 29.

Shell small, conical, high-spired, flatly rounded on the base, sculptured, white, dull on the surface, with a bright nacreous gleam shining through. Sculpture: spirals—on the upper part of the last whorl there are two rows of tubercles, the first and weaker is close up to the suture; the second is a little lower than the middle, and its tubercles are strong. Of these there are on each row twenty to twenty-five; they are scarcely connected by a spiral thread. The periphery is sharply angulated and defined by an expressed and tubercled carina, the tubercles of which are hardly so strong as those of the second row above, which from its larger points projects quite as much as the carina. On the base there is an infra-carinal furrow and three or four sharpish, equally parted, faintly tubercled, spiral threads, the innermost of which is most distinctly tubercled, and defines the umbilical depression. Longitudinals—the apical whorls, except the embryonic one, are crossed by high, sharp, slightly oblique ribs; but these on the latter whorls break up into tubercles, between which on the different rows there is a slight irregular connection by flattened ridges, which are oblique, interrupted, and on the base sinuous. Besides these, the surface is roughened by minute wavy irregular lines of growth. Color white, with a translucent layer of porcelaneous glaze over brilliant pearly nacre. Spire high, apex small, flattened, with the minute inflated 1 $\frac{1}{2}$ embryonic whorl rising a little exerted on one side. Whorls 7, projecting out squarely below the suture, flattened in the middle, protuberant at the second row of tubercles, and slightly contracted above the carina; at the carina sharply angulated. The base, which is flatly rounded, has a narrow flattish margin, and in the middle a slight umbilical depression, in the center of which is a minute umbilical hole almost covered by the pillar-lip. Suture linear. Mouth scarcely oblique, and very slightly inclined out from the axial line, squarish, but rounded on the base and at the angles a little broader than high, nacreous within. Outer lip not thin, with a slight callus just within it; it is slightly sinuated on the base at the outer corner. Pillar-lip, on leaving the body, bends over very flatly so as to cover the umbilicus, after which it curves round to the left; it has a very blunt tubercle in the middle, is a little reverted, and has a very slight furrow be-

hind it. Umbilicus a small open depression leading into a minute central pore. The slopes of the depression are obliquely scored by the tubercles of the central basal thread.

Alt. 0.22 in.; diam. 0.16 inch. (*Watson*.)

Off Culebra Island, West Indies, in 390 fms.

Trochus (Ziziphinus) tiara WATSON Journ. Linn. Soc. London xiv, p. 696; Challenger Gasterop., p. 60, t. 6, f. 4.—*Calliostoma tiara* Watson, DALL, Bull. Mus. Comp Zool., vi, p. 45; 'Blake' Gasterop., p. 365.

This beautiful little shell offers some rather perplexing features; for the curves of growth on the base indicate a slight sinus toward its outer edge, which, indeed, is shown in the actual mouth-edge,—a peculiarity suggestive of the genus *Basilissa*; but there is not seldom in the Trochidæ a tendency to a backward curve of the lip-edge at that point; and in this species there does not exist the characteristic infra-sutural sinus which would connect it with *Basilissa* or with *Seguenzia*, to which its tuberculated pillar and closed umbilicus rather point. *Margarita carinata* A. Ad., from the Philippines, has some points of resemblance with this, but is obviously very differently marked in the form of the umbilicus. (*Watson*.)

C. CORBIS Dall. Pl. 48, fig. 7.

Shell small, white, with a glassy minute apparently dextral nucleus and about six whorls. The first one or two have concave arched transverse ribs, and resemble a bit of a small *Scala*; the others are very strongly reticulately sculptured. The spiral sculpture consists of one very strong rib on the periphery, a slightly weaker one near the suture, and another (which is rarely absent) midway between them; on the base there are four strong spirals a little undercut at their outer edges. Transverse sculpture of strong thin oblique radii (27–30 on the last whorl) following the lines of growth, reticulating the spirals (on crossing which they become slightly nodose) and forming deep squarish pits, which are elongated in the adult by the crowding of the radii toward the mouth. The suture appears channelled, as the whorl falls short of the peripheral rib which overhangs it, but is not really so. The base is flexuously radiately ridged but not reticulate; the aperture rounded, thickened within, lirate; the pillar thick with an obtuse knob (almost a tooth) about the

middle of it. Umbilicus none; whorls flattened above between periphery and suture; base rather rounded.

Alt. 5.0, diam. 3.75 mill. (*Dall.*)

Off Havana, in 450 fms.

Calliostoma corbis DALL, "Blake" *Gasteropoda*, p. 365, t. 33, f. 1.

This species was at first confused with *C. tiara* Watson, which has not the continuous strong network, and in which the nodules which represent the intersections are of an imbricated character. The strong carina in *C. corbis* forms the periphery, in *C. tiara* the homologous spiral is comparatively faint and a little above the periphery. In *C. tiara* also the center of the base is indented, almost umbilicated, which is not the case in *C. corbis*. The latter is a more solid shell, and the curious callosity on the pillar does not occur in any of the specimens of *C. tiara* I have seen. (*Dall.*)

C. AURORA Dall. Pl. 48, fig. 10.

Shell delicate, nine whorled, acutely pointed; above with a color varying from light pink to straw color; below light cream color, the sharp peripheral carina lighter than the rest of the upper surface; general outline from nucleus to basal periphery somewhat concave; base concavely excavated within the margin, slightly convex toward the center; nucleus whitish, smooth; whorls gently rounded, closely appressed to the almost invisible suture and excavated in front of it; the last whorl flatter above, more rapidly enlarged at the periphery. Sculpture of small regular waves on the carina, about six in a space of 5.0 mill., giving a minutely scalloped outline; behind this a strong nodulous thread, revolving like a string of small uniform beads; then a more slender thread more finely beaded; in all eleven regularly alternating revolving threads at the beginning of the last whorl; this sculpture is very uniform all over the surface; base polished, smooth, except for two or three faint beaded lines and grooves about the pillar, and faint longitudinal and transverse growth markings; aperture nearly twice as wide as high; lower lip with a beautiful concavely arched outline, falling much behind the upper one; margin simple, except for sculpture marks; pillar short, arcuated, pearly, simple, ending in a slight point.

Alt. 21.0; diam. 26.5 mill. (*Dall.*)

Barbados, in 140-576 fms.

Calliostoma aurora DALL, "Blake" *Gasteropoda*, p. 366, t. 37, f. 2.

A single specimen and a fragment of this extremely lovely shell were obtained as above. It is well distinguished from its congeners, none of which closely resemble it. The color is evenly distributed in the type, but, as in *C. bairdii*, it is likely that the color may be more dark and pronounced in more northern localities. The marked features are the concavity of the slope of the spire and of the outer portion of the base, the polished base contrasting with the regularly beaded upper surface, and the delicately notched carina at the periphery. It is one of the most attractive species of the genus. (*Dall.*)

C. ORION Dall. Pl. 48, fig. 18.

Shell small, white, acutely conical, with a glassy sinistral globular nucleus and five (or more) whorls; radiating sculpture consisting of faint incremental lines; spiral sculpture on the upper surface of the last whorl of seven nodulous revolving lines, beginning at the suture; the first, third and fifth have larger nodules elongated in the direction of the lines, the second and fourth are more finely and simply evenly beaded. A single fine raised not nodulous thread separates each pair of the preceding; the sixth and seventh spirals are smaller than the fifth and close together; they stretch over a series of more distant swellings, and are concavely impressed between them; as these lines form the periphery, this gives a wavy or scalloped outline to the base, which has about eighteen such waves arranged to a certain extent in pairs, the distance and concavity between them alternating greater or less. The longer waves are articulated with pale brown, and the first and third spirals show traces of a similar articulation. The base is pretty sharply carinated, flattened, and finely spirally threaded, some of the threads showing faint traces of articulation; columella nearly straight, aperture nearly rectangular. There is no umbilicus or pit. Alt. 4.5, diam. 4.0 mill. (*Dall.*)

Off' Havana, in 80 fms.

Calliostoma orion DALL, "Blake" Gasteropoda, p. 367, t. 28, f. 2.

This little shell is not quite adult, and is evidently somewhat faded. Nevertheless, there is not any other species of the region possessing such a sculpture, and I have no doubt as to its novelty. (*Dall.*)

C. INDIANA Dall. Pl. 49, figs. 42, 43.

Shell thin, conical, yellowish, with faint brown articulations on the spirals, with a minute sinistral nucleus, and six and a half

whorls. Radiating sculpture of flexuous incremental lines, and fine wrinkles, which are more prominent toward the periphery on the last whorl and on the early whorls reticulate the spiral sculpture. On the last whorl these lines extend backward with moderate obliquity to the periphery, just above which is the fasciole caused by a well-marked but shallow rounded sulcus; on the base they make a deep rounded concave sweep backward, and then ascend toward the base of the pillar. The spiral sculpture on the early whorls comprise two sharp narrow little elevated threads at the periphery, three, less contiguous, above the fasciole, and one near the suture, neatly reticulated by the wrinkles and minutely nodulous at the intersections. The spirals over most of the shell are strap-like, flattened, narrow, and distinctly marked off from the impressed broader interspaces; on the last whorl there is a single smooth flat thread below the nodulated one next the suture, and two run in the middle of the fasciole. The peripheral thread has become single and much stronger than the others. On the base there are seven spirals, faintly nodulous, articulated with pale brown, and separated by much wider impressed interspaces, over which are a few fine spiral lines. The base is flattened, or even a little concave; the pillar moderately arcuate, the mouth four-sided. There is no umbilical pit. Alt. 8.3; diam. 7.6 mill. (Dall.)

Off Grenada, 170 fms.

Callistoma (Eucasta) indiana DALL, "Blake" Gasteropoda, p. 368, t. 32, f. 3, 5.

This pretty little shell has the aspect of a *Calliostoma*. I have had an opportunity of comparing it with *Forskälia declivis*, and should judge that this bears the same relation to *Calliostoma* that the other does to *Gibbula*. It certainly cannot be united with *Forskälia* or *Basilissa*. (Dall.)

C. indiana is the type of Dall's section *EUCASTA*, characterized by a moderate sulcus near the periphery on the shell, producing a fasciole as in *Pleurotomaria*.

Species inhabiting European Seas.

(Group of *C. granulatum* Born.)

C. GRANULATUM Born. Pl. 16, fig. 7.

Shell acutely conical, imperforate, thin, light, corneous or flesh-colored, more rarely rich orange, unicolorous or sparsely articulated

on the basal riblets with rich brown, and frequently with rather obscure clouded maculations of pale brown above. The surface is shining, *closely sculptured by numerous narrow threads or riblets, which on the spire are contiguous, finely, regularly beaded*, becoming more separated on the last whorl, the interstices obliquely striate, the spiral riblets either granulate or nearly smooth; base with numerous concentric lirule, granose or nearly smooth, the interstices radiately striate. The spire is elevated, slender, its outlines concave; apex minute, apical whorl smooth, rounded; suture linear, its position marked by a slightly prominent double granose cingulus above it. Whorls about 8, flat, the last strongly angular at the periphery, *convex beneath*. Aperture subquadrate, finely sulcate inside; columella subvertical, arcuate, cylindrical. Alt. 31, diam. 33 mill.

Mediterranean and Adriatic Seas; Atlantic coast, from Scotland to Madeira and Canaries.

Tr. granulatus BORN, Ind. rer. Natur. Mus. Cæs. Vind., p. 343 (1778); Test. Mus. Cæs., t. 12, f. 9, 10.—LAMARCK, An. s. Vert. vii, p. 26.—BLAINV., Fauna Franc., p. 260, t. 10, f. 5.—PHILIPPI, Enum. Moll. Sicil. i, p. 74, t. 10, f. 22; ii, p. 149.—FORBES & HANLEY, Brit. Moll. ii, p. 499, t. 67, f. 7.—JEFFREYS, Brit. Conch. iii, p. 327, v, p. 204, t. 63, f. 5.—HIDALGO, Mol. Mar. Esp., t. 59, f. 9-11.—FISCHER, Coq. Viv., p. 79, t. 18, f. 1.—BUQ., DAUTZENB. ET DOLLF., Moll. Mar. du Rouss., p. 359, t. 48, f. 1-5.—*Ziziphinus granulatus* BRUSINA, Contr. pella Fauna Dalm., p. 79.—*Tr. papillosus* DA COSTA, Brit. Conch., p. 38, t. 3, f. 5, 6.—DONOVAN, Brit. Sh., iv, p. 127.—TURTON, Conch. Dict., p. 190, t. 16, f. 62.—PHILIPPI, Conchyl. Cab., p. 85, t. 15, f. 5.—*Tr. fragilis* PULTENEY (not Gmel.) Catal. Dorset., p. 48, t. 16, f. 6.—*T. tenuis* MONTAGU, Test. Brit. i, p. 275, t. 10, f. 3.—RISSE, Hist. Nat. Eur. Mérid. iv, p. 129.

Larger than any other granulate European species, and further distinguished by the thin shell, inflated base, etc.

The following varieties are admitted by Messrs. Buquoy, Dautzenberg and Dollfus. The differential characters are very slight.

Var. *nobilis* Monts. Very large, of a uniform ferruginous brown color. Malta.

Var. *conoidea* Jeffr. More solid, more regularly conical than the type, the last whorl less dilated.

Var. *lævis* Brugnone. Spiral liræ not granulate.

Pleistocene of Monte Pellegrino.

Var. *lactea* Jeffr. White, without color markings. *Albescens* Monts. is a synonym.

Var. *maculata* Monts. Ornamented with decided flammules.

C. SUTURALE Philippi. Pl. 66, figs. 24, 25.

Shell oblique, depressed-conical, whorls planate, smooth in the middle, above and below coronated with series of small tubercles; last whorl angulated, marginated, inferior face convex, concentrically cingulate, umbilicate. (*Phil.*)

Sciacca. (Fossil.)

A most distinct species, almost 4 lines high, $4\frac{1}{2}$ broad. Whorls 7, plane, very smooth in the middle; superior nodules large, acute; margin of last whorl very densely transversely striate and with oblique sulci, elegantly granulate-nodose. Basal cinguli about 16, unequal. Aperture injured, angulated. (*Phil.*)

Tr. suturalis PHIL., Enum. Moll. Sicil. i, p. 185, t. x, f. 23.—JEFFREYS P. Z. S. 1883, p. 99.

This Pliocene fossil of Calabria and Sicily has been dredged living in the Bay of Biscay and Gulf of Marseilles by the 'Travailleur' and at numerous points in the Atlantic and Mediterranean by the 'Porcupine'. It lives in 174–1025 fms. Jeffreys says: 'The small fossil originally described and figured by Philippi did scant justice to this beautiful shell, which has now been discovered to be still living. My finest specimens are about seven-tenths of an inch in length and breadth; the color is cream, with the tint of a blush rose; and the sculpture is variable as regards the beaded rows of striæ. Young specimens have a deep umbilicus which is inclosed within a sharp ridge. The callous which covers the umbilicus in the adult is proportionally thinner than in *Bathymophila euspira* Dall.

C. FOLINI Fischer. *Unfigured*.

Shell covered umbilicate, corneous, little elevated, whitish flesh colored; suture plano-canaliculate; whorls scarcely convex, the penultimate minutely ornamented with 11 spiral, elegantly beaded liræ; beneath marked with 12 simple or divided, scarcely granulose liræ; umbilical area bounded by a spiral sulcus, covered by a central callous; aperture oblique, subquadrate.

Alt. 13, diam. 17 mill. (*Fischer.*)

Algeria, 900 meters.

Ziziphinus Folini FISCHER, Journ. de Conchyl., 1882, p. 50.

Said by Jeffreys to be a variety of *T. suturalis*, Phil.

(Group of *C. miliaris* Brocc.)

C. MILIARIS Brocchi. Pl. 18, figs. 10, 11; pl. 15, figs. 41, 42.

Shell strictly conical, imperforate, rather thin, but pretty solid, whitish or yellowish, with more or less obvious longitudinal flames, often reduced to a few spots on the ribs and a row of spots at the periphery of each whorl. *Surface densely finely sculptured by spiral liræ crossed by very regular oblique lamellæ, producing a clathrate pattern*, spiral liræ about 6 in number on each whorl, but often double as many, by the intercalation of riblets in the interstices. The periphery has a prominent keel, cord-like, with secondary spiral striae, or bifid, cut into compressed granules, somewhat prominent above the sutures. The base has about 8 concentric ribs, interstices radiately striate, sometimes with a central riblet. Spire conical; periphery acutely angled, base flat. Whorls about 7, aperture quadrangular, columella short, nearly straight. Alt. 13, diam. 13 mill.

Mediterranean and Adriatic Seas; Atlantic Ocean, Norway to Gibraltar; Cape Verde Is.; Miocene of Vienna, Italy, etc.

Tr. miliaris BROCC. Conch. foss. Subap., p. 353, t. 6, f. 1 (1814).—Risso, Eur. Mérid. iv., p. 130.—PHILIPPI, Conchyl. Cab., p. 71, t. 13, f. 19.—BUQ. DAUTZ. and DOLFF., Moll. du Rouss., p. 357, t. 42, f. 20–25.—*Trochus martini* BROWN, Ill. Conch. Gt. Brit., p. 129, t. 57, f. 11 (1827).—THORPE, Brit. Mar. Conch., p. 164, t. 3, f. 36.—*Tr. millegranus* PHILIPPI, Enum. Moll. Sicil. i, p. 183, t. 10, f. 25 (1836); Conchyl. Cab., p. 88, t. 15, f. 9.—JEFFREYS, Brit. Conch. iii, p. 325; v, p. 204, t. 63, f. 4.—FISCHER, Coq. Viv., p. 146, t. 49, f. 1.—*Conulus millegranus* Phil., Sars, Moll. Reg. Arct. Norv., p. 143, t. iv, f. 3 (Dentition).—*Ziziphinus millegranus* Phil. BRUSINA, Contr. pella Fauna Dalm., p. 79.—*T. clelandi* WOOD, Ind. test. suppl., t. 5, f. 15.—*T. clelandianis* LEACH, Synops. Moll. Gt. Brit., p. 172.—*T. elegans* JEFFR., teste Jeffreys.

The clathrate sculpture is very characteristic.

(Group of *C. zizyphinum* Linn.)

The Mediterranean species of *Calliostoma* immediately allied to *C. zizyphinum* form a group very closely allied in characters, and at the same time each species is excessively variable. The characters common to the group are the straightly conoidal outline, granulate upper whorls, the lower ones polished and either smooth or spirally sulcate. The following species are included: *zizyphinum*, *conulum*, *gualterianum*, *laugierii*, etc., each with numerous synonyms.

C. zizyphinum Linné. Pl. 65, figs. 90, 91, 92.

Shell conical, imperforate, solid; ground color fawn, whitish, lilac or yellowish brown, with (generally) a series of brown spots on the periphery, and radiately clouded with brown on the upper surface; the base unicolored or obscurely radiately streaked. Spire conic, outlines straight, apex minute, composed of a single smooth rounded whorl, several whorls following each with 4 granose spiral ridges; these become smooth and either obsolete or narrow on the later whorls. The periphery is angular, encircled by a smooth rounded rib which becomes a supra-sutural band or fasciole on the spire; whorls about 9, plane, base nearly flat, aperture quadrate, columella nearly straight, cylindrical.

Alt. 27, diam. 28 mill.; alt. 35, diam. 35 mill.

Mediterranean and Adriatic Seas.

T. zizyphinus Linn., Syst. Nat. xii, p. 1231 (1766).—And of LAMARCK, RISSO, PAYRAUDEAU, WEINKAUFF, BUQUOY, DAUTZ., and DOLLÉ, FISCHER, and other writers on Mediterranean shells.—*T. polymorphus* CANTRAINE (in part), Diagn. Esp. nouv., p. 10 (1835).—*T. conulus* var. β . PHIL., Enum. Moll. Sicil. i, p. 175.—*Zizyphinus Linnæi* MONTEROSATO, Nom. gen. e. Spec., p. 44 (1884).—*T. discrepans* BROWN, Mem. Wern. Soc. ii, p. 519, t. 24, f. 4.—*Zizyphinus conuloides* LAM. REEVE (part), Conch. Icon., f. 16b, 16c.—*Z. linnæi* MONTS., with vars. *dilatata*, *rotundata*, *scalaris*, *simulans*, *violacea*, *pallida* (= *cornea* and *albina*) MONTS., Bull. Soc. Mal. Ital. 1889, p. 77.—*Z. demissus* MONTS., Nom. Gen. e. Spec., p. 44; Bull. S. M. Ital. '89, p. 78.—*Z. typus* NARDO, Simon. moderna 1847, p. 70 (+ *Z. dalmaticus* MONTS. MS., *Z. novegradensis* BRUS. MS., *Z. conuloides* Auct., not LAM.,) teste MONTS., Bull. Soc. Mal. Ital. 89, p. 78.—*Z. virescens* (REN.) Auct. MONTS., l. c., p. 79.—*Z. vulgaris* GRAY, AD., P. Z. S. 1851, p. 163.—*Z. albidus* WOOD, Ind. testaceol. suppl., t. 5, f. 14.—*Tr. cingulatus* BROCCHI, Conch. foss. subap., p. 351, t. 5, f. 15.—*Phil. Conchyl. Cab.*, p. 67, t. 13, f. 12.

Var. conuloides LAM.

T. conuloides LAM., An. s. Vert. vii, p. 24 (1822).—POT. and MICH., Galerie de Douai, i, p. 330.—PETIT, Journ. de Conch. 1852, p. 177.—FISCHER, Coq. Viv., p. 81, t. 18, f. 3.—BUQ., DAUTZ. and DOLLÉ, Moll. du Rouss., p. 347.—*T. polymorphus* CANTRAINE, in part.—*T. zizyphinus* PHIL., Conchyl. Cab., p. 62, t. 13, f. 6.—JEFFREYS, Brit. Conch. iii, p. 330; v, p. 204, t. 63, f. 6.—SARS,

Moll. Reg. Arct. Norv., p. 141, t. iv, f. 4 (Dentition).—HIDALGO, Mol. mar. Esp., t. 59, f. 4, 5.—*T. levigata* J. Sowb., Min. Conch., t. 181, f. 1.—*T. Cranchianus*, and *T. irregularis* LEACH, Synops. Moll. Gt. Brit. (ed. Gray), p. 173, 171.—*T. chemnitzii* PHIL., Conchyl. Cab., p. 63, t. 13, f. 7.—MONTEROSATO, Bull. Soc. Mal. Ital., 1889, p. 79 (+ *multisulcosa* Hidalgo MS., + *granulifera* Jeffr.)—*T. agrestis* PHIL., Abbild. i, Trochus, t. 1, f. 6; Conchyl. Cab., p. 66, t. 13, f. 13.—*T. flavus* ANTON, Zeitschr. f. Mal. 1848, p. 105.—PHIL., Conchyl. Cab., p. 256, t. 38, f. 3.—REEVE, f. 33.

The synonymy of the two varieties is given separately above. The typical *T. zizyphinus* of Linnaeus is the large handsome form found in the Mediterranean. It is smooth, or has only slightly developed spiral riblets on the lower whorls. The upper (3 to 6) ones are densely granulate, showing the affinity of the form to *C. granulatum* Born, etc. The following mutations have received names:

Var. *cingulata* Broochi (pl. 18, fig. 12). Shell with pretty strong spiral sculpture, approaching conuloides. Var. *dilatata* Monts., no sutural cordon; last whorl dilated, rounded at periphery. Var. *strangulata* B., D. D., whorls compressed, a little concave around the middle (Var. *scalaris* Monts. is a syn.). Var. *alba* Monts., and Var. *violacea* Monts. There are numerous other forms named, but the practical use of this minute subdivision is very slight. The passion for names displayed by certain writers on Mediterranean shells reminds one of the vagaries of our own Rafinesque. The eccentric American naturalist however, betrayed great insight in taxonomic matters.

Var. CONULOIDES Lamarck. Pl. 65, figs. 67, 68.

Shell similar in form or more depressed than the type, with strong spiral ridges on the upper surface of the whorls.

Atlantic coast of Spain, France, England, etc.

This form is the *T. zizyphinus* of English authors. It varies from nearly smooth to strongly spirally sulcate. There are forms nearly or entirely intermediate between conuloides and zizyphinus.

Subvarietal names have been given as follows: Var. *Lyonsi* Leach, pure white. Var. *levigata* J. Sowb., smooth and polished, with strong sutural ridges, considerably expanded towards the base; spire depressed. Var. *granulifera* Jeffr. white, the ridges granulated. Var. *humilior* Jeffr. shell depressed, the diameter decidedly exceeding the alt. The *T. agrestis* of Philippi is figured on pl. 18, fig. 15.

I have retained *conuloides* as a *variety* of *zizyphinus*, rather than a species. It will be noted that *zizyphinus* from the Mediterranean has a spirally sulcate form (var. *cingulata*), and *conuloides* from northern Europe has a smooth one (var. *laevigata*). The latest treatment of the species is in Bull. Soc. Mal. Ital. xiv, p. 77, 1889, article by Monterosato. He splits the *zizyphinus* into five species!

C. CONULUM Linné. Pl. 65, figs. 70, 71, 72.

Shell elevated-conical, higher and narrower than *C. zizyphinum*; carinated at periphery; yellow or delicate flesh color, with obscure clouds or maculae alternately whitish and brown below the suture, and painted on the peripheral rib in the same alternate manner; the surface is highly polished; apical whorl smooth, the next four or five whorls densely granulate (granules in 4 or 5 series), the next whorl generally spirally ribbed, following whorls smooth, or with very obscure traces of spiral lines; base flat, smooth, save for 3 to 6 concentric articulated riblets around the axis; outlines of spire straight; whorls about 10, flat, separated by linear suture with a distinct narrow supra-sutural fasciole. Aperture rhomboidal, smooth within; columella shorter and more knobbed at base than *C. zizyphinum*, pearly.

Alt. 26, diam. 22 mill.; alt. 23, diam. 18 mill.

Mediterranean and Adriatic Seas; Atlantic Ocean at Canaries, Madeira and Azores Is.

T. conulus LINN., Syst. Nat. xii, p. 1230.—And of LAMARCK, PAYRAUDEAU, RISSO, PHILIPPI, WEINKAUFF, HIDALGO, FISCHER, BUQUOY, DAUTZENBERG & DOLLFUS and other authors.—*Z. lucidus* RISSO, Eur. Mérid., p. 126.—*Zizyphinus* (*Jancintinus*) *conulus* L. vars. *acuta*, *dilatata*, *striata sanguinea*, *pallida*, *aurantia*, *violacea* MONTEROSATO, Bull. Soc. Mal. Ital., 1889, p. 79, 80.

Var. dubius Phil.

T. dubius PHIL., Enum. Moll. Sicil. ii, p. 149, t. 25, f. 7, 1844; Conchyl. Cab., p. 66, t. 13, f. 11.—BUQ., DAUTZ., et DOLLF., Moll. Rouss., p. 352, t. 42, f. 5-7.—*T. conulus* var. *dubius* PHIL. FISCHER, Coq. Viv., p. 121, t. 49, f. 4.—*Z. dubius* PHIL. and vars. *dilatata*, *incavata*, *media*, *lirata*, *elevata*, *cinnamomea*, *olivacea*, *violacea* MONTEROSATO, Bull. Soc. Mal. Ital., 1889, p. 80.—*T. dubius* var. *spongiarum* B., D. & D., Moll. de Rouss., p. 353, t. 42, f. 8, 9.—*T. flavidus*, DUNKER, P. Z. S. 1856, p. 354.—? *T. pallidulus* DKR., P. Z. S. 1856, p. 355.

Separated from *C. zizyphinum* by the narrower, more elevated form, narrower supra-sutural fasciole, more polished smoother surface.

The mutations in color are numerous; the varieties enumerated by Monterosato are scarcely important enough to describe here, and besides, are described by their names.

Var. *DUBIUS* Philippi. Pl. 18, figs. 19, 20.

Smaller than typical *conulum*, with stronger spiral sculpture on the lower whorls; base flat. Alt. 15, diam. 13 mill. It is larger than *C. laugieri*, with more granulation on the upper whorls.

Mediterranean and Adriatic Seas.

The form called var. *SPONGIARUM* B., D. & D. (pl. 65, fig. 69) is thin shelled, the earlier whorls smooth, not granulate, the remainder with supra-sutural fasciole and 3 well-marked spiral furrows. Base of the last whorl traversed by numerous concentric cords; color light gray, longitudinally flamed, the spiral furrows breaking the flames in places into a tessellated pattern. There is also a uniform violet-colored form (*violacea* Monts. not Risso), and a white one (*albida* Dautz.). This well-marked variety lives on sponges in the Gulf of Gabes. *Z. basalis* Monts., ms. is a synonym.

C. NOCTURNUM Philippi. Pl. 18, figs. 3, 4.

Shell exactly conical, imperforate, smooth, *violaceous green*; whorls plane, margined by a slightly elevated cingulus at the base, *marked by regular distant impressed incremental striae*; last whorl obtusely angular; base nearly plane, smooth; aperture rhombic; columella very oblique, cylindrical, entire. (*Philippi*.)

Habitat unknown.

T. nocturnus PHIL., Conchyl. Cab., p. 112, t. 18, f. 9.

I have before me a single specimen of unknown history, referable to this species. It evidently belongs in the immediate vicinity of *C. conulum*, and is probably synonymous, differing in the darker color (livid-brown in my example), and *distant, impressed striae of increment*. The upper whorls are granose; the suture has a narrow flat margination above; there are no concentric lines on the base, except, perhaps, slight indications of them at the center.

C. GUALTERIANUM Philippi. Pl. 17, fig. 30.

Shell conical-elevated, imperforate, polished, solid, yellowish-brown or olive, clouded with brown, the earlier 4 whorls dark bluish or

greenish, spirally sulcate, the 2d whorl somewhat granulate; the rest of the whorls smooth, flat, with a narrow supra-sutural fasciole, which on the last whorl is not developed; periphery rounded-angular; base smooth except for about 4 fine riblets around the axis; whorls about 9. Aperture smooth within, columella a trifle swollen at base, nacreous, and either purple or whitish inside.

Alt. $11\frac{1}{2}$, diam. $8\frac{1}{2}$ mill.; alt. 13, diam. 10 mill.; alt. 12, diam. 8 mill.

Mediterranean; Coasts of France, Corsica, Sicily, Algiers, etc.

T. lævigatus PHIL., Enum. Moll. Sicil. i, p. 175 (not *lævigatus* Sowb. or Gmel.).—*T. gualterianus* PHIL., in Conchyl. Cab., p. 69, t. 13, f. 15.—*T. gualtierianus* Phil. FISCHER, Coq. Viv., p. 404, t. 119, f. 5.—*T. gualtierii* Phil. WEINKAUFF, Conchyl. des Mittelm. ii, p. 361.—B., D. & D., Moll. du Rouss., p. 356, t. 42, f. 15–19.

This form is separated from *C. conulum* by absence or great reduction of the granulation on the earlier whorls, the less distinct supra-sutural fasciole, entirely effaced on the last whorl. It is narrower than *C. laugierii*, and smoother; but in my opinion will prove to be connected by intermediate examples with that species. A purple form of this species is among the color varieties before me.

C. LAUGIERI Payraudeau. Pl. 65, figs. between fig. 80 and fig. 90.

Shell similar to *T. dubius* and *T. conulus*, but smaller, generally darker in color, the apical whorls not (or but slightly) granulate.

The form is straightly conical; apical whorl minute, smooth; following whorls, to the number of *three or less*, granulate; then there are several spirally grooved whorls, the lower ones either smooth or grooved. The supra-sutural fasciole is distinct, articulated; base spirally grooved, sometimes smooth except around the axis. Whorls about 8, color, (1) dark olive-green or olive-brown, unicolored or longitudinally clouded with brown and lineolate with bluish, (2) yellowish, clouded with brown or yellow, (3) uniform purple. Aperture sulcate or smooth inside.

Alt. 10, diam 8 mill.; alt. 10, diam. 10 mill.; alt. 12, diam. 10 mill.

Mediterranean and Adriatic Seas.

T. laugierii PAYR. Moll. de Corse, p. 125, t. 6, f. 3, 4, 1826.—BLAINVILLE, Fauna Franc., p. 262.—PHILIPPI, Enum. Moll. Sicil. ii, p. 150; Conchyl. Cab., p. 68, t. 13, f. 14.—FISCHER, Coq. Viv., p. 150, t. 49, f. 4a.—B., D. and D., Moll. du Rouss., p. 353, t. 42, f. 10–14.

—*Zizyphinus laugierii* Payr. JEFFR., Piedm. Coast, p. 27.—MONTs., Conch. litt. Méd., p. 11.—*T. maculatus* RISSO, Eur. Mérid. iv, p. 128.—*T. violaceus* RISSO, l. c., p. 127, t. 8, f. 111 (1826).—BRUSINA, Contr. pella Fauna Dalm., p. 79.—MONTs. (with var. *monochroa* Monts.), Bull. Soc. Mal. Ital. 1889, p. 80.—*T. nigerrimus* (Renier) BLAINV., Fauna Franc., p. 262.—*T. seriopunctatus* (Ren.) BLAINV., l. c., p. 263 (1830).—MONTs., Bull. S. M. I. 1889, p. 81 (with var. *cingulella* Monts.).—*T. hyacinthinus* Ren. BLAINV., l. c., p. 259, t. 10, f. 2.—MONTs., Bull. S. M. I. 1889, p. 80, var. *candida* Monts.—*T. polymorphus* CONTRAINE (in part), Bull. Acad. Bruxelles, 1855, p. 386.—*T. candidus* BRUSINA, Conch. Dalm. Ined., p. 25 (1865).—*T. solidus* Phil., Conchyl. Cab., p. 90, t. 15, f. 12.

This form is very mutable in color, and numerous varieties have been proposed. The following are the more prominent.

Var. *violacea* RISSO (pl. 65, fig. 88), a beautiful purple form. Var. *candida* BRUS., pure white. Var. *olivaceoconcolor* RÉQ., uniform olivaceous without flames or blotches, from the Gulf of Gabes. Var. *seriopunctata* Ren., dark olive, uniform or mottled with lighter, the periphery and supra-sutural fasciole conspicuously articulated with olive-brown and white.

Var. *SOLIDUM* Phil.

Shell conical, imperforate solid, pale olivaceous, articulated with yellowish; whorls plane, base margined by a prominent cingulus; whorls sculptured with 3 slightly elevated cinguli, the last rounded-angular; base obsoletely 7 to 9 cingulate; aperture rhomboidal, columella very oblique, entire. Alt. 14, diam. 12 mill. (*Phil.*)

This form I place here with some doubt on account of its more oblique columella, which forms no angle where it joins the basal lip. It may be a synonym of *C. conulum*, or possibly distinct.

C. OCCIDENTALIS Mighels & Adams. Pl. 37, figs. 2, 3.

Shell rather small, thin, imperforate, opalescent; surface shining, strongly sculptured above with smooth, yellowish spiral ribs, narrower than their interstices, numbering 3 or 4 on each whorl; periphery very bluntly subangular, base nearly flat, with a few ribs around the axis and at periphery, otherwise smooth. The spire is elevated, acute; whorls 7 to 8; apical whorl minute, smooth, rounded; following three whorls beaded on the spiral ribs; sutures impressed; aperture rather rounded, pearly; columella, arcuate, narrow, not dentate or truncate at base. Alt. 12, diam. 10–11 mill.

Maine Northward; Scandinavia; N. Scotland; fossil in the English Crag. (40–90 fms.)

Trochus occidentalis MIGH. & AD., Bost. Journ. Nat. Hist. iv, p. 47, t. 4, f. 16 (1841).—JEFFREYS, Brit. Conch. iii, p. 333; v, t. 63, f. 7.—GOULD, Invert. of Mass., ed. Binney, p. 286, fig. 548.—*Margarita alabastrum* Beck, in LOVEN, Ind. Moll. lit. Scand., p. 20 (1846).—*T. alabastrum* Beck, PHILIPPI, Conchyl. Cab., p. 91, t. 15, f. 14.—FORBES & HANLEY, Hist. Brit. Moll. ii, p. 497, t. 66, f. 7, 8.—*Tr. formosus* FORBES, Ann. Mag. Nat. Hist. xix, p. 96, t. 9, f. 1 (1847).—SEARLES WOOD, Crag Moll., p. 125, t. 13, f. 2.—*Tr. quadricinctus* S. WOOD, olim.—*Zizyphinus alabastrum* Beck, REEVE Conch. Icon., f. 46.—*T. occidentalis* Migh., SAKS, Moll. Reg. Arct. Norv., p. 142, t. 9, f. 7, t. iv, f. 5 (dentition).

An exquisite little gem, like an opal in its iridescence, with smooth, narrow, more opaque riblets. It has the same distribution as several species of *Margarita*.

(Group of *C. exasperatum* Pennant.)

C. EXASPERATUM Pennant. Pl. 17, figs. 20, 42; pl. 18, figs. 5–8.

Shell small, turreted, solid, thick; color purplish-brown, blackish-purple or red, with white longitudinal lines or stripes, the base radiately striped or dotted with white. Surface lusterless, the whorls encircled at the peripheral carina by a rounded granulate ridge, above this with 4 spiral granose liræ, the interstices densely, regularly marked by elevated lamellar striæ; base encircled by 6 concentric liræ, narrower than the densely radiately striate interstices; apical whorls red. Spire very high; whorls 9–10, the last angular, aperture quadrangular, throat brilliantly iridescent, basal margin thickened, columella subvertical, obliquely truncate below.

Alt. 12, diam. $6\frac{1}{2}$ mill.; alt. 10, diam. $6\frac{1}{2}$ mill.

Mediterranean, Adriatic and Black Seas; Atlantic Ocean, England and Belgium to Canaries; Madeira and Azores Is.

T. exasperatus PENNANT, Brit. Zool. iv, p. 126 (1777).—JEFFREYS, Brit. Conch. iii, p. 324; v, p. 203, t. 63, f. 4.—FISCHER, Coq. Viv., p. 266, t. 89, f. 1.—B., D. & D., Moll. du Rouss., p. 362, t. 43, f. 1–7.—And of other authors.—*T. conulus* DACOSTA, Brit. Conch., p. 40, t. 2, f. 4.—*T. minutus, striatus*, etc., CHEMNITZ, Conchyl. Cab., v, p. 30, t. 1529.—*T. minutus* Chem. DESHAYES, in Lam., An. s. Vert. ix, p. 151.—*T. erythroleucos* GMEL., Syst. Nat. xiii, p. 3581.—LAM., An. s. Vert. vii, p. 30.—*T. exiguus* PULT., Cat. Dorset., p. 48, t. 12,

f. 4.—And of MONTAGU, TURTON, FORBES & HANLEY, and of other authors.—*T. crenulatus* BROCCHI, Conch. fos. Subap., p. 354, t. 6, f. 2.—SCACCHI, Cat. Conch. Reg. Neap., p. 13.—PHILIPPI, Enum. Moll. Sicil. i, p. 176; Conchyl. Cab., p. 69, t. 13, f. 17–22.—*T. pyramidatus* LAM., An. s. Vert., vii, p. 30.—*T. matonii*, PAYR., Moll. de Corse, p. 126, t. 6, f. 5, 6.—GRANGER, Moll. de Cete, p. 16.—*Z. (Jujubinus) matonii* PAYR. MONTS., Conch. Litt. Medit., p. 12; Nom. Gen. e Spec., p. 46.—*T. tricolor* RISSO, Hist. Nat. Eur. Mérid. iv, p. 127, t. 9, f. 135.—*T. elegans* BLAINVILLE, Fauna Franc., p. 266, t. 10, f. 8.—*Jujubinus corallinus* MONTEROSATO, Nom. Gen. e Spec., p. 46 (1884).—*T. strigillatus* and *punctatus* REXIERI, teste Blainville.—*T. jacobii* ARADAS and *T. vulgaris* RISSO, teste MONTS.—*T. socia* FISCHER, Coq. Viv., p. 403, t. 119, f. 3.—*Zizyphinus pyramis* REEVE, Conch. Icon., f. 41 (not *T. pyramis* Gmel. nor Born).—*T. exasperatus* var. *excavata* MONTS., Boll. Soc. Mal. Ital. 1880, p. 219.—*T. monterosatoi* B., D. & D., Moll. Rouss., p. 367, t. 43, f. 18, 19.

Differs from *C. striatum* in having fewer, coarser spiral liræ, and more prominent peripheral and supra-sutural fasciole. The following is a variety.

Var. MONTEROSATOI B., D. & D. Pl. 63, fig. 27.

Whorls very concave, separated by a very prominent supra-sutural fasciole or rib; sculpture consisting of spiral liræ, more granulate on the earlier than on the later whorls. Color opaque white with longitudinal black flammules which ordinarily become confluent in pairs upon the supra-sutural fasciole.

Gulf of Gabes; Gulf of Tarentum.

C. STRIATUM Linné. Pl. 17, figs. 39, 40.

Shell small, elongate-conical, imperforate, solid, brown or yellowish olive, rarely unicolored, striped or lined longitudinally with white, sometimes the striping broken into a tessellated pattern. Surface dull or shining, the whorls with a much less prominent ridge at periphery than in *C. exasperatum*; the supra-sutural fasciole when discernable, not projecting nor prominent; the whorls are encircled by numerous subequal lirulæ, the interstices slightly or strongly obliquely striate; base with numerous striæ or riblets, about double the number possessed by *C. exasperatum*.

Alt. 10, diam. 7 mill.; alt. 9, diam. 7 mill.; alt. 10, diam. 8 mill.

Mediterranean and Adriatic Seas; Atlantic Ocean, England to Gibraltar; Canaries; Madeira; Azores.

T. striatus LINN. Syst. Nat. xii, p. 1230.—And of most authors.—*T. parvus* DA COSTA, Brit. Conch., p. 41.—*T. conicus* DONOVAN, Brit. Sh., t. 155, f. 1.—*T. depictus* DESH., Expéd. Sci. de Morée, p. 140, t. 18, f. 23-25.—*T. gravesi* FORBES, Rep. Æg. Invert., p. 137.—*T. sartorii* ARADAS, teste Philippi.—*T. parvulus* PHIL. BRUS., Conch. Dalm. ined., p. 25 (and *parvulus* PHIL., Enum. Moll. Sicil. i, p. 155, t. 25, f. 11 ? a fossil species).—*Trochus littoralis* BRUSINA in sched., l. c., p. 25.—*Jujubinus æquistriatus* MONTS., Nom. Gen. e Spec., p. 47 (1884).—*T. æquistriatus* MONTS. B., D. & D., Moll. du Rouss., p. 368, t. 43, f. 21, 22.—*T. smaragdinus* MONTS. DAUTZ, Journ. de Conchyl. 1883, p. 307.—*Jujubinus smaragdinus* MONTS., Nom. Gen. e Spec., p. 46.—*T. striatus* var. *elenchoides* ISSEL, Crociera del Volante, p. 436, figs. 6, 7, 1878.—*J. elenchoides* MONTS., Nom. Gen. e Spec., p. 47 (1884).—*T. elenchoides* MONTS., D., D. & D., Moll. du Rouss., p. 368, t. 43 f. 20, 25.—*Tr. (Zizyphinus) striatus* Linne, WATSON, Challenger Gasterop., p. 56.

Distinguished from *C. exasperatum*, a species of nearly the same size and outline, by its finer more numerous spiral striae, less strongly truncate columella, etc.

The principal varieties are the following :

Var. *DEPICTUM* Deshayes.

Shell elevated, with spiral striae, a large peripheral ridge, and fine striae of increment, the latter crossing the spiral sculpture, render the surface visibly granulose. Color greenish iridescent, with longitudinal brown flames.

Var. *ÆQUISTRIATUM* Monterosato.

Shell solid, broad at base, without a noticeable peripheral rib at carina or above sutures; surface traversed by numerous spiral liræ, the interstices finely obliquely crispate-striate; base with about 7 concentric ribs, and outside of these a number (about 5) of minute close ones; color light gray, with longitudinal narrow black lines, sometimes interrupted.

Var. *SMARAGDINUM* Monterosato.

Quite conical, elevated, the whorls plane, the last decidedly angular at periphery; surface with numerous spiral smooth riblets, and a peripheral supra-sutural rib divided into two by a central groove; color of earlier whorls white, with large blotches and dots of reddish purple; the rest of the whorls and the base are a beautiful

light green, with white and dark dots articulating the ribs. There is often a peculiar iridescence shining through the color. A white form ("var. *albina* Monts.") and a golden yellow one ("var. *aurea* Monts."), are found.

This form has the peculiarly slender spire, sharply angular periphery and flat base that seem to be characteristic of *Calliostoma* from the Gulf of Gabes. These modifications are shown by the var. *spongiorum* of *C. laugierii*, var. *fraterculum* of *C. unidentatum*, etc. In fact, a number of these small species of *Calliostoma* seem to undergo variations which produce parallel series in the several specific types.

Var. *ELENCHOIDES* Issel. Pl. 63, figs. 24, 25.

Last whorl rounded at periphery; surface apparently smooth, with metallic reflections, but under a lens seen to be finely sculptured by numerous spiral and oblique striæ. Color very variable; brown, with zigzag white flammules, ashen gray, varied with bright rose and irregular white spots, or fawn colored, with short white longitudinal flames around the periphery, etc., etc. Resembles *Elenchus* in the form and iridescent surface.

C. *GRAVINÆ* Monterosato. Pl. 63, figs. 28, 29.

Spire moderately elevated, conical, composed of 7 flat whorls, traversed by non-granulose liræ, about 6 on the penultimate whorl; the ridge immediately above the suture larger, more salient than the others; there are numerous spiral striæ between the liræ, and several on the supra-sutural ridge. Last whorl subangular at the periphery, convex on the base, which is imperforate, and provided with a very small umbilical rimation; the base has 5 concentric ribs. Suture shallow. Aperture subquadrangular; columella very slightly arcuate, not truncate at base; lip sharp, rounded, smooth inside. Color white, with longitudinal flammules of reddish-brown; supra-sutural ridge articulated with spots of the same, the other liræ dotted with carmine; columella white, interior nacreous. (*B., D. & D.*)

Mediterranean; Atlantic Ocean, at Orotava, Canaries.

T. (Zizyphinus) gravinæ MONTS., Enum. e Sinon., p. 22, 1878.—*B., D. & D.*, Moll. du Rouss., p. 369, t. 43, f. 26–30.—*Jujubinus gravinæ* Monts., Nomencl. Gen. e Spec., p. 47.

Less elevated than *T. exasperatus*, the last whorl less angular at periphery, more convex beneath. The red-dotted liræ are also characteristic, and while appearing granulate they are really not so.

C. GONIOSTOMUM Menke. Pl. 18, fig. 25.

Shell elevated, convex-conic, imperforate, olivaceous, flammulate with white tessellated with dots; whorls plane, base not margined; last whorl subangulate, with 7 to 8 shallow transverse sulci; base with about 8 sulci; aperture rhombic; columella with an acute tooth; lip broadly thickened inside. Alt. 9, diam. 6 mill. (*Phil.*)

Habitat unknown.

T. goniostomus MKE, Zeitschr. f. Mal. 1848, p. 107.—PHIL. Conchyl. Cab., p. 211, t. 31, f. 6.

Probably a synonym of *C. striatum*, or at most a mere variety.

C. TURRICULUM Philippi. Pl. 18, fig. 9.

Shell turreted, imperforate, transversely cingulate, dark rosy, flammulate with scarlet; whorls plane, divided by profound sutures, the last angulate; transverse cinguli 5, equaling the obliquely striate interstices; aperture rhombic; columella straight, cylindrical entire. (*Phil.*)

This species is very distinct in its size and steeple-like form. The shell is pretty solid, consists of 7–8 flat whorls, separated by a deep suture; they have 5 little-elevated transverse cinguli, which, upon the last whorl are split into two by an impressed line. The interstices, wide as the cinguli, are prettily sculptured by the striae of increment. On the base I count 6 concentric liræ. The aperture is rhombic, columella straight, cylindrical, with no tooth below. Color dark rose-red, with bright red flames.

Alt. 7, diam. 4 mill. (*Phil.*)

Habitat unknown.

T. turricula PHIL., Conchyl. Cab., p. 313, t. 44, f. 19.

Is it a synonym of *C. exasperatum* Pennant?

C. UNIDENTATUM Philippi. Pl. 17, figs. 13, 14 (enlarged).

Shell small, elongate-conical, imperforate, rather solid; ground-color white, with a more or less pink tinge on the upper part of each whorl, especially on the upper part of the spire, or sometimes yellow or gray in place of pink; entire surface longitudinally marked with distinct narrow black lines. Surface lusterless, densely spirally lirate and striate, the principal ridges subgranose, interstices densely obliquely crispate-striate; periphery generally scalloped or sub-nodose, angular; base flat, finely or obsoletely lirulate; whorls about 10, the apical ones rosy, the rest concave below the sutures;

spire very slender. Aperture subtriangular, iridescent and green inside, columella short, vertical, *abruptly dentate or truncate at base*.

Alt. 9, diam. 6 mill.

Mediterranean Sea, on the coasts of Corsica, Sicily, Tunis, Syria; Adriatic Sea.

T. unidentatus PHIL., Enum. Moll. Sicil. ii, p. 150, t. 25, f. 8; Conchyl. Cab., p. 91, t. 15, f. 13.—WEINKAUFF, Conchyl. des Mittelmeeres ii, p. 363.—FISCHER, Coq. Viv., p. 279, t. 91, f. 4.—*T. fraterculus* MONTS., Bull. Soc. Mal. Ital., 1879, p. 220.

Distinguished from the preceding by the slender spire, and very abruptly truncated columella.

Var. *fraterculum* MONTS. is angular, sharply sculptured, the supra-sutural ridge very strong; base broader; whitish, with gray hieroglyphs. *Tunis.*

It is placed by Watson in the synonymy of *C. striatum* Linné, on the authority of Jeffreys.

C. MONTAGUI Wood. Pl. 17, figs. 15, 16.

Shell imperforate or very minutely perforate, conical; whorls 7, a little convex, the earlier buff, following pale buffish-ashen, ornamented with obscure maculations or zones of chestnut, obliquely striate, spirally liræ, liræ on penultimate whorl 6. subequal; last whorl a little convex above, carinated in the middle, convex beneath and provided with 7–8 concentric, white-and-brown articulated liræ; aperture rhomboid, columella subtruncate below.

Alt. $7\frac{1}{2}$, diam. 6 mill. (*Fischer.*)

Atlantic and Mediterranean, England to Algiers.

T. montagui WOOD, Index Test., Suppl., t. 6, f. 43.—PHILIPPI, Conchyl. Cab., p. 89, t. 15, f. 11.—FORBES & HANLEY, Hist. Brit. Moll. ii, p. 511, t. 65, f. 10, 11.—FISCHER, Coq. Viv., p. 270, t. 89, f. 3.—*Tr. montacuti* JEFFR., Brit. Conch. iii, p. 320; v, t. 63, f. 1.—WEINKAUFF, Conchyl. Mittelm. ii, p. 366.

C. RUSCURIANUM Weinkauff. *Unfigured.*

Whorls flat; spiral ribs thicker than in *C. montagui*, separated by much narrower interstices; umbilicus subperforate.

Algiers; Tunis.

An unfigured species, closely related to *C. montagui*, perhaps a variety of it. Included by Watson, on the authority of Jeffreys, as a synonym of *T. striatus* Linn.

T. ruscirianus WEINKAUFF, Conchyl. des Mittelmeeres ii, p. 367, 1868.—*T. montagui* Wood, WEINK., Journ. Conchyl. 1862, p. 350.—*T. montacuti* var. MCANDREW, teste Weinkauff.

C. DELPRETEANUM Sullioti.

Shell thin, conical, corneous-reddish or blackish-blue; apex corneous, smooth, acute; base a little convex, whorls little convex, sulculate, the two last rapidly increasing, the last lightly carinated, oblique, descending, the sulcule of the base more distinct; aperture subrotund; columella contorted; lip simple, acute. Whorls 6, apex excepted. Alt. $10\frac{1}{2}$, diam. of base, 8 mill. (*Sul.*)

Sts. of Messina, at Pantano Piccolo.

Trochus pumilo ARAD. and BEN., Conch. Viv. Mar. della Sic., p. 163, not of Philippi.—*Jujubinus delpreteanus* SUL., Bull. Soc. Mal. Ital. 1889, p. 28.

This species has been heretofore confounded with the smaller, differently proportioned *T. pumilio* according to Sullioti. That species (*pumilio*) is figured on pl. 40, fig. 35. I have included it in *Gibbula*, doubtless in error, as it seems to be a *Calliostoma*. I have not seen specimens.

Calliostoma of uncertain position, or unfigured.

ZIZYPHINUS INDISTINCTUS (Wood) Reeve, Conch. Icon., f. 35. See *Cantharidus indistinctus*, page 128. This shell I have not seen. It has also been figured by Philippi, Conchyl. Cab., pl. 43, fig. 7.

ZIZYPHINUS NEBULOSUS A. Adams. Shell conoidal, imperforate, rufous-brown, variegated with white; whorls nearly plane, ornamented with unequal granose cinguli, the last subangulate, base a little convex, ornamented with subgranulose cinguli, articulated with brown and white; aperture subtetragonal; columella white, incurved, subtruncate at base; lip lirate within. (*Ad. in P. Z. S.* 1851, p. 168.)

Raines Island.

ZIZYPHINUS ASPERULATUS A. Adams. Shell conical, imperforate, whitish, ornamented with radiating purple spots; whorls nearly flat, carinated in the middle, ornamented with unequal cinguli, the superior granulate, inferior nearly plane; last whorl subangulate, base plane, sculptured with flat ribs; umbilical tract depressed, covered by a callous; aperture subrotund; columella straight, truncate at base; lip lirate within. (*Ad. in P. Z. S.* 1851, p. 168.)

Habitat unknown.

The following species of Gould are known to me only by the original descriptions reprinted below.

ZIZIPHINUS RUBIDUS Gould. Testa acute conica, solida, nitida, aurantiaca, flammulis saturatioribus flexuosis radiantibus variegata; anfr. 7, imbricantibus, sulcis tribus reclivantibus ornatis; peripheria obtusa; basi planulato, imperforato, striis concentricis inculpto; apertura subquadrata; columella brevi, porcellana, antice attenuata; fauce argillacea, lævi.

Axis 15, diam. 12 mill. (*Gld.*, in Proc. Bost. Soc. Nat Hist. viii, p. 18, 1861).

Habitat unknown.

Z. INFUSCATUS Gould. Testa parva, conica, albida, maculis fuscis subquadratis picta; anfr. 8, seriebus 7 granulorum (minoribus sæpe additis) quarum suturali et peripherica subquadratis et plerumque tessellatis; basi convexo, filis 8 concentricis, radiatum clathratis inculpto; regione umbilicali excavato, imperforato; apertura subquadrata, ad columellam angulata; columella postice rotundata, antice obsolete dentata; fauce margaritacea.

Axis 10, diam. 9 mill. (*Gld.*, *loc. cit.*, p. 19).

Kagosima Bay.

May possibly be the young of *Z. pyramis*; also like *Z. millegranus*. (*Gld.*)

Z. ACUTUS Gould. Testa minuta, acute conica, prasina rosaceo et albo variegata, striis tenuibus volventibus impressa, interspatiis concinne clathratis; anfr. 8, subconcavis, antice dilatatione interdum duplici etiam noduloso munitis; basi convexiusculo; regione umbilicali rosaceo, vix perforato; apertura subquadrata.

Axis 4, diam. 3 mill. (*Gld.*, *loc. cit.*, p. 19).

Inhabits Eastern Coral Seas.

Z. URBANUS Gould. Testa parva, ovato-conica, cinerea, ad suturam et ad peripheriam maculis quadratis pallidis et fuscis seriatum articulatilis ornata; liris ordinatis simplicibus ad 6 (interdum nonnullis tenuioribus) cineta; interspatiis exiliter clathratis; anfr. 7, convexis, peripheria obtusa; basi concavo; umbilico modico, costa marginato; apertura subcircularis; columella arcuata, margine erecto.

Axis 6, diam. 5 mill. (*Gld.*, *loc. cit.*, p. 19).

Kagosima Bay.

Subgenus EUTROCHUS Arthur Adams.

Eutrochus AD., Proc. Zool. Soc. Lond. 1863, p. 506. Type, *E. perspectivus* Ad.

(*Old world species.*)

C. ADAMSI Pilsbry. *Unfigured.*

Shell depressed-conical, broadly and profoundly umbilicated, pale flesh-color, painted with tawny flammules and sparsely spotted; whorls 7, plane, transversely deeply lirate, the liræ unequal, subdistant, angulate at the suture, last whorl granulose around the umbilicus; aperture sulcate inside.

Alt. 1 inch, diam. $1\frac{1}{2}$ inch. (*A. Ad.*)

Tasmania.

E. perspectivus AD., P. Z. S. 1863, p. 506 (not *T. perspectivus* Koch, also an *Eutrochus*).

The shell is broader than high, rather thin, and of a pale yellowish flesh-color, with fulvous blotches and flammules. The whorls are transversely ridged and angulate at the sutures, and the interior of the umbilicus is white. Mr. Cuming possesses but a single specimen from Tasmania. (*Ad.*)

I hesitate to change the name of this, the typical species of *Eutrochus*, but it is preoccupied by an undoubtedly congeneric species, described years before. See under American species of *Eutrochus*.

C. LESSONÆANUM Tapparone-Canefri. Pl. 39, fig. 24.

Shell depressed-conic, umbilicate, yellowish-white painted with brown-orange flammules, the apex obtuse, brown. Whorls 7, plano-concave, sloping, the lower margin elevated; ornamented with granulated spiral cinguli, with smaller intervening ones; last whorl acutely angulated; base plane, concentrically granose-lirate; umbilicus large, funnel-shaped, white, crenulated at the margin.

Alt. $12\frac{1}{2}$, diam. 18 mill. (*Canefri.*)

New Zealand. (Mus. of Turin.)

Eutrochus lessonaeunus CAN., Viaggio intorno al Globo della R. fregata 'Magenta,' p. 59, t. 1, f. 9 (from Mem. della Reale Accad. delle Scienze di Torino, ser. II, vol. xxviii), 1874.

C. SCITULUM A. Adams. Vol. X, pl. 41, fig. 27.

Shell small, thin, umbilicate, with slender elevated spire and broad body-whorl; color yellowish, obscurely maculate with brown. Whorls

about 7, convex, the apical one smooth, following 3 or 4 granulate, the rest densely spirally striate, with light incremental lines which decussate the lirulæ, especially beneath. Spire slender, its lateral outlines concave, last whorl rounded at periphery or obtusely angled, convex beneath. Aperture rounded, outer and basal lips thin, forming a half-circle, columella white, deeply arcuate, ending in an inconspicuous tubercle at base. Umbilicus deep, funnel-shaped, bounded by an angle. Alt. 12, diam. 11 mill.

S. Australian Coasts.

Ziziphinus scitulus A. AD., P. Z. S. 1854, p. 38.—REEVE, Conch. Icon., f. 44.—*T. scitulus* Ad. FISCHER, Coq. Viv., p. 274, t. 90, f. 3.

A very distinct little shell, with slender spire, granulose upper whorls, and wide, rather depressed body-whorl.

C. EXQUISITUM Sowerby. Pl. 65, fig. 89.

Shell conical, rather convex, profoundly umbilicated, pale golden-brown, multilinate with brown. Whorls $6\frac{1}{2}$, sloping, slightly convex, ornamented all over with numerous brown little-elevated cinguli; suture distinct; last whorl obtusely angulate below; base a little convex, aperture subquadrate; columella nearly straight, slightly oblique. Alt. $4\frac{1}{2}$, diam. 4 mill. (*Sowb.*)

Habitat unknown.

Tr. (Ziziphinus) exquisitus SOWB., P. Z. S. 1888, p. 210, t. 11, f. 6, 7.

C. MULTIGRANUM Dunker. *Unfigured.*

Shell turreted-conic, narrowly umbilicate, light yellow; whorls 8, nearly plane, encircled by numerous unequal granuliferous riblets; sutural cingula elevated, subundulate, spirally striate, pallidly tessellate, base a little convex, covered with about 16 subgranose alternately larger and more delicate riblets; umbilicus narrow surrounded by a white plate; columella oblique, terminating in a pearly denticle; aperture subtetragonal.

Alt. 12, diam. 10 mill. (*Dkr.*)

St. Vincent, Australia.

Ziziphinus multigranus DKR., Mal. Blätt., xviii, p. 169, 1871.

Allied to *S. gilvus* Phil.

C. SUBGRANULATUM Dunker. *Unfigured.*

Shell wide-conical, apex very acute, profoundly umbilicated, whitish, variegated with yellowish; whorls 10, plane, a little prom-

inent below the sutures, and slightly scalate; encircled by 9–10 subgraniferous unequal ribs; base little convex, spirally costate, the costæ subplane; umbilicus profound, funnel-shaped, encircled by two prominent crenulated ribs; aperture subquadrate.

Alt. 20, diam. 21 mill. (*Dkr.*)

Has the *habitus* of *Z. conulus* L., and the sculpture of *Z. armillatus* Wood.

Bass's Strait, Australia.

(*American species.*)

C. JUJUBINUM Gmelin. Pl. 40, fig. 16.

Shell pyramidal-conic, solid, heavy, with a narrowly perforate funnel-shaped umbilicus. Color chestnut-brown, purple-brown on the upper whorls, marked with narrow, curved, rather widely separated longitudinal white streaks, the base minutely dotted with white. The sculpture consists of numerous little-elevated spiral beaded lirulæ, with many spiral striæ between them; the base is flat and has coarser concentric subgranulose liræ, becoming finer toward the outer margin. Spire elevated, the whorls about 10 in number, concave above, swollen and projecting at the periphery, the last obtusely angled. Aperture quadrate, oblique; outer lip beveled, strongly 5 or 6 lirate within; basal lip straight, very thick, obtuse, crenulate, lirate inside; columella arcuate, ending below in a point or tooth. Umbilicus white within. Alt. 33, diam. 26 mill.

Coast of N. Carolina to Fla., Texas, Yucatan; Entire West Indies.

Trochus jujubinus GMEL. Syst. Nat. xiii, p. 3570.—PHILIPPI, Conchyl. Cab., p. 37, t. 7, f. 8, 9, t. 13, f. 5.—FISCHER, Coq. Viv., p. 80, t. 18, f. 2.—*Zizyphinus jujubinus* Gm., REEVE, Conch. Icon., f. 12.—*Calliostoma (Eutrochus) jujubinum* Dall, 'Blake' Gasterop., Bull. M. C. Z. xviii, p. 369.

The figure of this species is not very characteristic, being smaller than average shells, and the whorls are not prominent enough above the sutures. The older authors, including Reeve, supposed the species to come from the Indian Ocean and Australian Seas, but Philippi and Fischer know it to be a West Indian shell. Many American collectors have long known the species to be Antillean. The young have a minute smooth, rounded, rather elevated dextral nucleus, and bicingulate periphery.

Var. *PERSPECTIVUM* (Koch) Philippi. Pl. 66, figs. 35, 36.

Form straightly conical, broader than *jujubinum*; whorls flat above, not prominent at sutures or concave, the spiral riblets or striae fewer, and all beaded. Color light brown, clouded with darker, often marked with white on the periphery; umbilicus with a larger perforation, and bounded by a distinctly beaded rib.

Alt. 20, diam $17\frac{1}{2}$ mill.

Florida; Georgia; E. Coast Honduras (Simpson).

Trochus tampaensis CONRAD, Proc. Acad. Nat. Sci. Philada. iii, p. 26, t. 2, fig. 35, Feb., 1846.—*Trochus perspectivus* KOCH, PHILIPPI, Abbild. u. Beschreib. i (pt. 2), Trochus, t. 1, f. 5, Feb., 1843.—PHIL., Conchyl. Cab., p. 108, t. 17, fig. 9.—*Calliostoma jujubinum* var. *tampaensis* CONR., DALL., Bull. M. C. Z. xviii, p. 369.—*Eutrochus alternatus* SOWB., P. Z. S. 1873, p. 719, t. 59, f. 5.

I regret that the name of this variety must be changed from that commonly known in American collections, but I have no choice, as the Koch-Philippi name clearly has priority, and the identity of the species with our *tampaensis* cannot be doubted. *Eutrochus alternatus* Sowb. (pl. 40, fig. 21), seems to be identical. Sowerby's remarks on the distribution of *Eutrochus* are amusing.

Typically distinct in the straightly conical form, but said by Dall to blend with *jujubinum*. In the umbilicus *perspectivum* resembles *C. javanicum*.

Var. *Rawsoni* Dall. Shell smaller, whorls excavated above, umbilicus smaller, pillar thin, and tooth weak or absent; color dark red or very dark brown and red, with lunate white cloudings; cone of shell more acute, nucleus white, minute, globular. (Dall.)

This seems to be merely the normal young stage of typical *jujubinum*.

C. *PULCHELLUM* Philippi. Pl. 66, figs. 32, 33.

Shell conic, perforate, rosy-whitish, painted with blackish-purple flames; whorls plane, prominent at base, margined, sculptured by elevated transverse lines; columella straight, base truncate. (Phil.)

The form is completely conical; the 6-7 whorls are nearly even, a little concave above, slightly margined below, with about 5 elevated transverse lines, between which there are occasional weaker ones. The last whorl is pretty sharply angular; base slightly convex, with about 8 concentric elevated lines. Umbilicus narrow, perforating only the last whorl. Aperture nearly rhombic, columella vertical,

truncate below, color reddish-white, decorated with dark brown-red flames and little red dots. Separated from *T. jujubinus* by the smaller size, lack of granulation, etc.

Alt. 14, diam. 15 mill. (*Philippi*.)

Habitat unknown.

Tr. pulchellus PHIL., Zeitschr. f. Mal. 1846, p. 101.—Conchyl. Cab., t. 13, f. 3.—*Zizyphinus pulchellus* REEVE, Conch. Icon., f. 42.

I know nothing of the form. It may be a synonym of *C. jujubinum*.

C. ZONAMESTUM A. Adams. Pl. 62, fig. 68.

Shell conical with straight outlines, the base flat, with a deep, funnel-shaped umbilicus; rather solid; light yellowish, with numerous narrow, sharply-defined dark-brown or blackish spiral lines. Outlines of spire straight, sutures not at all impressed; apex minute, smooth; whorls about 9, flat, encircled by numerous equal, finely-beaded liræ, about 9 on penult. whorl, the interstices densely costulated by fine incremental striæ; last whorl acutely angled at periphery, flat below, and nearly smooth toward the outer edge, finely granose-striate on the inner half. Aperture rhomboidal, lip thin; columella arcuate above, strongly toothed below; umbilicus wide, bounded by a beaded cord.

Alt. 24, diam. 25 mill.; alt. 26, diam. 33 mill.

West Indies; Tortola (Swift); St. Kitts (Dall); Honduras (Dyson).

? *Trochus javanicus* LAM., An. s. Vert. vii, no. 50.—DELESSERT, Rec. de Coq., t. 35, f. 2?—PHILIPPI, Conchyl. Cab., p. 110, t. 18, f. 5.—FISCHER, Coq. Viv., p. 77, t. 17, f. 3.—*Zizyphinus javanicus* Lam., CHENU, Manuel, f. 2662.—*Zizyphinus zonamestus* AD., P. Z. S. 1851, p. 166.—REEVE, Conch. Icon., f. 21.—*Calliostoma zonamestum* Rve. DALL, Blake Gasterop.

Following the suggestion of Dr. Dall, I adopt Adams' name for the West Indian shell described as *T. javanicus* by Philippi and Fischer. There is no doubt of the locality, specimens with unquestionably correct data being in the Philadelphia and Washington collections. It is quite possible that *T. javanicus* of Lamarek is a distinct species. The figures in Delessert show a more elevated form, slightly swollen at the sutures, and more distinctly cingulate there, than the shells before me. This opinion has been advanced by Tapparone-Canevari (Zool. della Fregata 'Magenta,' p. 60, 1874), who says that the figures of Delessert's *Recueil*, pl. 35, f. 2, and of

Philippi, *Conchylien Cabinet*, pl. 18, fig. 15 (*sic* should be fig. 5) represent the true *javanicus*, from which *zonamestus* is distinguished by the dark lines in the inter-liral spaces, crenulated liræ and decidedly crenulated umbilical rib. Fischer gives the locality 'Java,' but his figures exactly represent the West Indian shells.

The fact seems to have escaped the attention of authors that Arthur Adams himself considered his *zonamestus* a synonym of *Javanicus*. *Vide* P. Z. S. 1854, p. 40. The above synonymy is merely tentative.

C. YUCATECANUM Dall. Pl. 48, figs. 19, 20.

Shell belonging to the group of *C. palmeri* Dall, *C. eximium* Rye., and *C. lima* of the western coast of America. Shell depressed-conic with a rather acute apex and six whorls; nucleus white, delicately sculptured; remainder of shell whitish with faint streaks of brown transverse to the whorls, arranged so as to present the appearance of seven brownish streaks radiating from the apex; other dots and streaks of brown irregularly distributed; upper side of whorls with one smooth revolving keel nearly midway between the sutures, but a little nearer the periphery; this gives the whorls a somewhat tabulated aspect; above this on the last whorl are four smaller more or less beaded or crenulated keels, below it are two without nodosities, reaching the gently rounded periphery; between these are intercalary threads or grooves; base supplied with nine rounded revolving ribs, those nearer the umbilicus with a tendency to beading; interspaces about as wide as the ribs, which are crossed by slight elevations due to lines of growth; umbilicus perforate, bordered by a strong white rib, inner wall smooth or transversely striate; pillar emarginate, twisted, not thickened, ending in a round lump above the basal margin of the aperture; the latter oblique, sub-rectangular, nacreous, sharp-edged, crenulated by the ribs. Operculum as usual in the genus. Alt. 7, diam. 7 mill. (*Dall.*)

Yucatan Strait, 640 fms.; *Off North Carolina*, 15-32 fms.

C. yucatecanum DALL, Bull. M. C. Z. ix, p. 47; 'Blake' Gasterop., p. 370, t. 24, f. 4.

Most of the northern specimens are less elevated and proportionately wider than the Blake specimen which has been figured, but which seems to have been a little unusual in its elevation. (*Dall.*)

C. SAYANUM Dall. Pl. 60, figs. 7, 8.

Shell large, polished, solid, eight-whorled, having a good deal the form of the *C. tigris* of New Zealand; umbilicated; straw-yellow

lineated with red-brown, and having a broad rose-colored peripheral band. Walls of umbilicus marked with incremental lines, slightly excavated near the carina, above convex, the convexity revolving with the whorl; convexity straw-color, a deep brown band revolving just within the carina. Spiral sculpture outside the carina, which is not very sharp, consisting of two strong beaded spirals alternating with two fine simple brown elevated lines, then nine subequal, finer, less coarsely beaded, the upper angle of the aperture being at the ninth; all these straw-color with brown interspaces; then three fine yellow-brown undulated lines, then a larger nodulated peripheral spiral with a smaller similar one on each side of it, these and their interspaces of a deep rose-pink; above the pink band is the largest nodulated spiral, followed by (on the last whorl) seven or eight somewhat smaller, alternating larger and smaller, the last separated by a smooth space from the suture. These are all straw-color with brown interspaces and an occasional intercalary fine line. Radiating sculpture only of faint incremental lines. Nucleus lost; the earlier whorls have three nodulated spirals. Base and whorls a little convex, periphery evenly rounded, sutures distinct. Aperture ovate, margin simple, columella concavely arched, a slight angle, not to be called a tooth, formed by the end of the umbilical carina at the base. Interior extremely nacreous. Operculum amber-colored, fibrous toward the edges, with twelve or more whorls, a small central elevation on the inner side. Alt. 37, diam. 40 mill. (*Dall.*)

Off Cape Hatteras, in 107-120 fms.

Calliostoma (Eutrochus) sayanum DALL, "Blake" *Gasteropoda*, p. 370, t. 33, f. 10-11.

Animal with stout rounded muzzle, short stout tentacles, large black eyes, a very large anterior epipodial lobe, two lateral cirri, and two or three small ones from under the operculum. The foot is bluntly rounded before and behind. The color of the external soft part is uniform straw-color.

This is altogether the finest American species, and cannot be confounded with any other now known. (*Dall.*)

C. BENEDICTI Dall. Pl. 49, fig. 44.

Shell depressed, with an acute apex and slightly concave outline, umbilicated, polished; straw-colored, lineated with red-brown and pale pink; base convex, slightly flattened, periphery rounded; nucleus minute, apparently dextral; whorls seven or more; um-

bilicus deep and narrow, with flexuous walls excavated near the carina, which is margined with an opaque white band; spiral sculpture beginning at the umbilicus; outside the carina, which is simple, two strong broad subnodulous spirals separated by a deep line, then fourteen or more equal smooth flattish spirals with narrower interspaces and obsolete spiral striulæ here and there; then a smooth or slightly striate peripheral space; all the preceding straw-color. Above the periphery two pink and one straw-colored large smooth and rounded spirals, one smaller smooth one, then three large and two intercalary smaller nodulous spirals separated from the suture by a narrow smooth space. The interspaces are brown, the elevations straw-color. The early whorls have two or three smooth and one or two nodulous spirals, the former remain constant with growth, the latter increase in number. Radiating sculpture of flexuous incremental lines, hardly visible. Aperture rounded, squarish, columella white, thin, concave, a small notch at its base. Operculum yellow, multispiral, translucent, polished. Type specimen not full grown. Alt. 14, diam. 18 mill. (*Dall.*)

Off Cape Lookout, North Carolina, in 200 fms.

Calliostoma (Eutrochus) benedicti DALL, "Blake" (Gasteropoda, p. 371, t. 32, f. 7.

This is a very handsome species, recalling the var. *psyche* of *Calliostoma bairdii*, from which it is easily distinguished by its umbilicus and sculpture. (*Dall.*)

C. CINCTELLUM Dall. Pl. 49, figs. 31, 32.

Shell small, thin, pearly white with faint touches of pale brown, seven-whorled, with a globular inverted minute nucleus and rather convex base; spiral sculpture of two prominent spirals, one peripheral, simple, sharp, with occasional touches of brown; against this the suture is laid in the earlier whorls, while in the last whorl it descends below it; the other spiral is above the periphery, and is stronger and ornamented with (on the last whorl) about forty sharp projecting thorn-like tubercles, each inclined a little forward, and alternating brown and white. Between this and the periphery the space is excavated. Above these there are about four (on the earlier whorls one or two) small raised spiral lines separated by much wider interspaces, nodulated with small but prominent nodules at the intersections with the radiating sculpture; all the sculpture growing fainter, and intercalary fine lines appearing, toward the

aperture on the last whorl. Base with two strong nodulous spirals separated by a deep interspace, the inner one forming the umbilical margin; outside of these 16-20 fine flattened spiral threads, with about equal interspaces, reaching to the periphery and hardly ruffled by the incremental lines. Radiating sculpture much like that of *C. tiara*, of numerous, on the earlier whorls strong, slightly elevated oblique threads, extending clear across the whorls and reticulating the spirals; these radii grow fainter and finally on the last whorl nearly disappear; on the base there are only faint flexuous incremental lines. Umbilicus narrow, its walls flexuous, yellow. Aperture squarish, the pillar little concave, not toothed, margin thin and simple. Upper surface of whorls except the sculpture flattened; suture distinct, not channelled. Operculum horny, multispiral. Alt, 9.5; diam. 8 mill. (*Dall.*)

Off Havana, in 174 fms.

Calliostoma (Eutrochus) cinctellum DALL, "Blake" Gasteropoda, p. 372, t. 32, f. 1, 4.

Soft parts whitish, foot short, pointed behind, muzzle rounded, gill simple, anus prolonged into a long free papilla, eyes large; tentacles long and stout, without frontal lobes; epipodium with a large anterior lobe, and four cirri all anterior to the operculum and about of equal size. Jaws separate, squarish, composed of small horny obliquely set rods, whose lozenge-shaped end-sections reticulate the surface under the microscope.

The dentition is peculiar. The rachidian and (on each side) five laterals have broad simple bases with a pear-shaped outline; the cusps, which might be compared to the stem of the pear bent over, are extremely narrow and long and symmetrically serrate on each side with 4-6 serrations. The major uncinus is stout and has a large four-toothed ovate cusp; there are about twenty more slender uncini with scythe-like cusps serrate on the outer edge; outside of these are two or three of a flat form, like a section of a palm-leaf fan from handle to margin with four riblets, and the distal edge with three or more indentations. Under pressure these uncini have a tendency to split up lengthwise, beginning at the indentations. They are flat and smooth, thinner towards the distal end, and have no distinct shaft.

This interesting species looks at the first glance as if the excavated space between the peripheral cinguli was fasciolar, like that of *Eucasta*, but a more careful inspection shows that there is

no sign of a notch or sulcus in the lines of growth. The dentition forms a combination so far not recorded among the Trochidae, but which will perhaps seem less singular when more species have been examined. The radula is quite minute and difficult to examine; when only the cusps of the central and lateral teeth were in the field of the microscope, they were so slender and elongated as to suggest little tails, and the symmetrical notching gave them almost a jointed appearance. The shell is very pretty, and recalls *Basilissa* in its general appearance. (*Dall.*)

(Section *Dentistyla* Dall, 1889.)

C. ASPERRIMUM Dall.

Shell conical, yellowish white, turreted, higher than wide; whorls five to seven, the last forming half the height of the shell; base rounded, umbilicus small, partly covered by the reflexed lip, transversely striate, with one longitudinal thread close to the bounding nodulated strong carinal rib; upper whorls with two strong longitudinal ribs, the lower of which forms the carina of the last whorl; near the beginning of the latter a single less conspicuous thread is intercalated between these two; the carina is above the middle of the last whorl, and between it and the bounding rib of the umbilicus are four strong simple revolving threads, not nodulated, between which near the mouth, intercalary, weaker threads begin to appear. Suture distinct, compact not channelled, except by projection of the ribs above and below it which give the shell a turreted appearance. Lip thin or slightly thickened, denticulated on the edge by the rib ends; pillar little thickened, its base apparently toothed by the ends of the umbilical threads (these denticulations are probably missing in the perfect adult); mouth slightly oblique, not produced below; transverse sculpture consisting of threads following the lines of growth, rising into lamellæ between the ribs, and in passing over them (except the basal ones) forming squarish projections, cutting the ribs obliquely. Nucleus smooth, polished, the remainder dull white, with no visible naere. (*Dall.*) Alt. $7\frac{1}{2}$, diam. 6 mill.

Off Martinique and Barbados, 100–220 fms.

Var. DENTIFERUM Dall. Pl. 60, figs. 10, 11.

Sculpture more strongly and exclusively nodulous; a strong blunt tooth on the columella just within the aperture and above the base. Outer lip lirate within. Alt. $7\frac{1}{2}$, diam. 6 mill. (*Dall.*)

Off Barbados.

Margarita asperrima DALL, Bull. M. C. Z. ix, p. 40, 1881.—*Calliostoma (Dentistyla) asperrimum* DALL, 'Blake' Gasterop., p. 373, and var. *dentiferum*, t. 23, f. 7, 8.

C. SERICIFILUM Dall. Pl. 60, figs. 19, 20.

Shell delicately but sharply reticulate all over; two peripheral spirals minutely spinose at the intersections; columellar tooth present but not strong. Shell thinner and more nacreous than the typical form, and with the radiating and spiral sculpture not differing so much in strength. Alt. 4.5; diam. 4.1 mill. (Dall.)

Off Grenada, in 92 fms.

Calliostoma (Dentistyla) sericifilum DALL, 'Blake' Gasteropoda, p. 373, t. 24, f. 1, 1a.

These species are somewhat puzzling. With the external sculpture and umbilicus of a rather conical Solariella, we find in adult specimens a well-marked blunt tooth on the columella, and the aperture opposite furnished with raised liræ. In other specimens these are not visible, but then it is impossible to say that they are completely adult. The sculpture runs the usual gamut of evenly reticulate; nodose reticulate, the intersections marked by little imbrications while most of the net-work is obsolete; and, finally, of uneven reticulation where the cords one way are much stronger than those by which they are intersected. None of the specimens contained the soft parts, so their relations must for the present remain problematical. The group is hardly Thalotia, being umbilicate; it is certainly not a Euchelus or Craspedotus. Perhaps the most reasonable conclusion, in the absence of more information, is that this section bears to Thalotia about such a relation as Entrochus bears to Calliostoma. The tooth is on the pillar, not at its anterior end. (Dall.)

C. STRIGOSUS (Gm.) Philippi. Pl. 57, figs. 46, 47.

Philippi has figured under this name, a conical little species like *Calliostoma exasperatum* in form and color, but narrowly umbilicated. Whorls 6-7. Alt. 9, diam. 8 mill.

Coasts of Morocco and Portugal.

T. strigosus GMEL., Syst. Nat. xiii, p. 3573, teste PHILIPPI, Conchyl. Cab., p. 61, t. 13, f. 4.

C. ÆRUGINOSUM Philippi. Pl. 67, figs. 81, 82.

The exactly conical, pretty thin shell consists of 7 completely flat whorls, which are beset on the acute basal carina with spines;

the last is acutely angular, the base level, curving into the umbilicus. The sculpture both above and below consists of 7 scarcely elevated spirals, a little narrower than their interstices; the latter are prettily crisped with lines of growth. The aperture is nearly circular, angled on the lower outer part, peristome continuous. The base is usually unicolored green; the umbilicus white, perforating.

Alt. 8, diam. 8 mill.

Habitat unknown.

T. æruginosus PHIL., Zeitschr. f. Mal., 1849, p. 146; Conchyl. Cab., p. 314, t. 45, f. 1.

Subgenus PUTZEYSIA Sullioti.

Putzeysia SUL., Bull. Soc. Mal. Ital. 1889, p. 30. Type, *Tr. clathratus* Arad.

I do not know the systematic position of this group. Sullioti says that *Tr. gemmulatus* does not belong to the same subgenus as *Tr. clathratus*, but I am inclined to believe that it does.

P. CLATHRATA Aradas.

Shell orbiculate-conoid, imperforate, solid, whorls convex, planulate at the sutures and subcanaliculate, clathrate with longitudinal and transverse elevated equidistant lines, forming slight tubercles at their intersections; aperture suborbicular, lip subthickened.

Alt. $3\frac{1}{2}$, diam. 3 mill.

Straits of Messina.

T. clathratus ARADS., Atti. Acc. Gioenia 1847, p. 78.—MONTEROSATO, Bull. Soc. Mal. Ital. 1880, p. 252.—*T. gemmulatus* MONTS., olim.—*Putzeysia clathrata* Arads., SULLIOTTI, Bull. Soc. Mal. Ital. 1889, p. 30.

A fossil species, lately dredged at the above locality. I have translated Sullioti's diagnosis.

P. WISERI Calacara. Pl. 57, fig. 43.

Shell small, subconic, the 6-7 whorls more or less convex, latticed by transverse cinguli (6 on penultimate whorl), and longitudinal elevated, oblique lines; aperture suborbicular; lip sulcate within.

Alt. 5, diam. 4 mill.

Off the Gulf of Bona, Algiers, 1456 fms.; Bay of Biscay.

Tr. wiseri CALC., Giornale Maurolico, Anno 2; Cenno Moll. viv. e foss. Sic., Palermo, 1841, p. 31, t. iv, f. 14.—MONTEROSATO, Bull. Soc. Mal. Ital. vi, p. 251, 1880.—JEFFREYS, Ann. Mag. N. II. x,

1882, p. 31.—*Tr. gemmulatus* PHILIPPI, Enum. Moll. Sicil. ii, p. 226, t. 28, f. 5, 1844.

Marquis de Monterosato, to whom we are indebted for much careful work on Mediterranean shells, has given the synonymy of this species, which was originally described as a fossil. The above description is a translation of Philippi's diagnosis of *T. gemmulatus*, and the figure is copied from his illustration of the same.

I am not sure of the generic position of the species.

Subgenus *TURCICA* A. Adams, 1854.

Turcica A. AD., Proc. Zool. Soc. Lond., 1854, p. 37. Type, *T. monilifera* Ad.—*Ptychostylis* GABB., Proc. Cal. Acad. Sci. iii, p. 187, 1865, type, *P. coffea*.—*Perrinia* H. & A. AD., Genera, p. 419, 1858, type, *P. angulifera* Ad.

It will be seen that here as in many groups I have departed from the arrangement of genera given in the first part of this monograph. *Turcica* I now regard as a subgenus under *Calliostoma* (as Fischer has already classed it), and until the dentition is known I see no reason for placing it elsewhere. *Perrinia* may be retained in a sectional sense for those species which are not distinctly toothed on the columella, and have the mouth lirate inside. The genus ranges on both shores of the Pacific, from California and Australia northward. No deep sea forms have yet been discovered.

T. MONILIFERA A. Adams. Pl. 57, fig. 27.

Shell conoidal, subdiaphanous, thin, imperforate, tawny, golden-shining; whorls a little convex, sculptured with spiral beaded cinguli, their interstices obliquely striate; sutures canaliculate; base convex, with granose cinguli, some granules marked with brown; aperture suborbicular; columella spiral above, produced into a tooth below; margin of the lip acute, lirate inside. (*Ad.*)

Moreton Bay, Australia.

Turcica monilifera AD., P. Z. S. 1854, p. 37, t. 27, f. 1.

The name is preoccupied in *Calliostoma*.

T. IMPERIALIS A. Adams. Pl. 63, figs. 30, 31.

Shell conoidal, spire acuminate, base obliquely produced; solid; tawny-red variegated, ornamented by transverse cinguli articulated with chestnut; whorls somewhat convex, with a strong nodulose cingulus at periphery, and beaded lirulæ alternating with elevated lines, interstices obliquely striate; sutures canaliculate; furnished

with a series of granules above; base convex, furnished with concentric granulose cinguli. Aperture oblique, subcircular; columella tortuous, terminating in an anterior tooth; lip subexpanded, with entire margin; inside smooth. (*Ad.*)

Tsutsuki, West Coast of Japan, 37 fms.; Bay of Jesso; Hakodadi.

T. imperialis AD., P. Z. S. 1863, p. 507.—*Trochus imperialis* Ad., LISCHKE, Jap. Meeres Conchyl. iii, p. 67, t. 4, figs. 4–6.—*Turcica imperialis* Ad., DUNKER, Ind. Moll. Mar. Jap., p. 141.—*Trochus adamsianus* SCHRENCK, Moll. des Amurlandes, p. 358, t. 16, f. 5 (1867).

More elevated than *T. monilifera*; base more oblique; aperture more produced; and the golden-nacreous appearance wanting.

T. CONCINNA A. Adams. *Unfigured.*

Shell small, ovate-conic, imperforate, whitish, solid; whorls a little convex, subimbricating, separated by profoundly canal-formed sutures; finely crenulated below the sutures; covered with encircling liræ, the interstices elegantly clathrate; base convex; aperture oblique, semicircular; columella tortuous, terminating in a tooth; lip sub-thickened, obsoletely sulcate inside. (*Ad.*)

Uraga, Japan.

T. concinna AD., P. Z. S. 1863, p. 508.

T. COREENSIS Pease. Pl. 63, fig. 26.

Shell conoidal, rather thin, subdiaphanous, of a light grayish fawn-color, cinereous at the base, and sparingly marked with oblique stripes and small spots of deep brown. Whorls flattened; body-whorl large, rounded at its periphery, all ornamented with transverse rows of close irregular sized granules, which become almost obsolete near the base. Apex acute; suture canaliculated; base convex, imperforate; outer lip sharp. Aperture large, breadth and height equal, and pearly within. Columella oblique, with two obtuse tubercles on its edge. (*Pse.*)

Sea of Corea.

Turcica coreensis PSE., P. Z. S. 1860, p. 189, t. 51, f. 2.

This species is closely related to *T. monilifera* Ad. It differs in the aperture being smooth inside, and the whorls flat. The figure of *T. moniliferus* also represents the sutural canal as being continued round the body-whorl. In the present species it terminates with the suture. The columella is also quite different, descending obliquely to the right. (*Pse.*)

T. CAFFEA Gabb.

Shell conical, thin; spire elevated; one nuclear whorl smooth; 5 perfect whorls, subangulate at the margin, obliquely flat above; body-whorl very slightly convex at the base; suture strongly impressed; surface marked by revolving tubercular ribs, about 18 on the body-whorl, one broad one on the margin, and about 8 or 9 on the under side; these ribs are less numerous on the preceding volutions, only 4 can be counted on the upper side of the penultimate whorl; the tubercles are arranged so as to present an irregular quin-cunx; epidermis a rich coffee-brown, darker between the tubercles than on their summits; aperture obliquely quadrangular, outer lip and base acute, internally pearly white, columella bearing two strong folds, the lower one of which borders the truncated end and terminates in a faint tubercular enlargement; behind the columella is a slight groove running from the base to the end of the upper columellar fold. Alt. 13, diam. 14 mill. (*Gabb.*)

Monterey, 20 fms.; *Post pliocene of San Pedro & Sta. Barbara.*

Ptychostylis caffa GABB, Proc. Cal. Acad. Nat. Sci. iii, p. 187, 1865.

Fossil specimens an inch in alt. have been found.

Section PERRINIA H. and A. Adams.

T. ANGULIFERA A. Adams.

Shell elevated-conoidal, imperforate; whorls nearly plane, imbricated, angulated below, longitudinally nodose-costate, ornamented with transverse girdles of subdistant tubercles, interstices channelled; last whorl subangulate; columella straight, short, terminating in a small tooth; lip subduplicate, sulcate inside. (*Ad.*)

Puerto Galero, Id. of Mindoro, 6 fms.

Monodonta angulifera AD., P. Z. S. 1851, p. 176.

T. LIROSTOMA A. Adams.

Shell elevated-conical, imperforate, whitish; whorls plane, with three strong granulate cinguli, interstices deeply clathrate; suture canaliculate; last whorl angulated; columella tuberculate; lip strongly lirate within. (*Ad.*)

Lord Hood's Island, 8-10 fms.

Monodonta lirostoma AD., P. Z. S. 1851, p. 177.

T. ELISA Gould. Pl. 67, figs. 67, 68, 69, 74.

Shell thick, solid, acutely conical, the spire elevated with straight lateral outlines, the base convex, imperforate; color whitish-ashen. Surface dull; apex minute, its tip subimmersed, apical whorl smooth, the rest of the whorls (7 to 8 in all) traversed spirally by three strong cords, the central one narrowest, all closely beaded by the decussation of close, regular, elevated lamellæ of increment, which sharply sculpture the interstices. Two lamellæ arise from each bead of the superior spiral cord. The sutures are very deeply, narrowly channelled. The last whorl is angled at the periphery, and bears 7 concentric liræ on the base, the inner ones smaller; the whole closely sharply sculptured by radiating lamellæ. Aperture very oblique, subquadrate with about 9 sharp entering liræ; outer lip beveled, columella short, subvertical, cylindrical, with three or four small, transverse, rather acute folds on the lower half.

Alt. 19, diam. 13 mill.

Singapore; China.

Trochus elisus GOULD, Proc. Bost. Soc. N. H. iii, p. 92, 1849; U. S. Expl. Exped. Moll., p. 178, atlas, fig. 216.

The specimen described and figured by Gould was evidently a young shell. The species is known by the three spirals of the spire whorls and the several small folds of the columella.

T. MACULATA Brazier. Pl. 67, fig. 78.

This species is similar to *T. elisa* Gld., but has *four* revolving cinguli on each whorl of the spire instead of *three*, and different columellar edge.

Shell conical, with elevated spire, its outlines straight. There are about 8 whorls, each one encircled by 4 spirals, the upper and lower ones more prominent; these are closely, regularly set with compressed granules, caused by the decussation of elevated regular lamellæ of increment, which cut the inter-liral spaces into little pits. The sutures are deeply, narrowly channelled; the base is convex, with 7 or 8 concentric liræ, interstices clathrate. The aperture has about 11 elevated lines within; outer lip beveled, its acute margin crenulated, columella short, subvertical, with traces of two obtuse, nearly obsolete, blunt tubercles in the middle. The color is whitish, sparsely spotted with brown, especially on periphery and base.

Alt. 14, diam. 11 mill.

Cape York, N. Australia, 11 fms.; *Off Katow, N. Guinea*, 8 fms.; *Warrior Reef and Darnley Id., Torres Straits*, 8-30 fms.

Thalotia maculata BRAZIER, Proc. Linn. Soc. N. S. Wales ii, p. 44, 1877.

Described and figured from specimens received from Mr. Brazier.

T. STELLATA A. Adams. Pl. 67, fig. 77.

Shell elongated-conic, slender, strong, white, imperforate. Whorls of the spire strongly, acutely carinated above each suture, and bearing numerous short triangular spinous tubercles there. Above this carina each whorl has 3 spirals; the upper is low, wide, bluntly tubercled, the two median are narrow equal liræ; the interstices are lamellose-striate. The base has 4 coarse concentric ribs, the outer one largest, interstices clathrate. Whorls 6, the last carinated at periphery. Aperture rounded-rectangular, angular at the position of the peripheral carina, with sulci inside corresponding with the ribs of outer surface. Columella short, vertical, straight, and in the young specimen before me, not dentate, but according to Adams terminating in a tooth. Alt. 9, diam. 7 mill.

China Seas.

Turcica stellata AD., P. Z. S. 1863, p. 508.

I have described and figured a shell which I believe to be the young of *stellata*. It is allied to the following species. Both may be found to belong in the typical section of *Turcica* rather than in *Perrinia*.

T. CHINENSIS Sowerby, Jr. Pl. 34, figs. 24, 25.

Shell trochiform, white; spire elevated, acute; whorls 9, separated by canaliculate sutures, the first 2-3 smooth, the rest concavely sloping, obscurely obliquely striate, above concavely depressed with a corona of numerous plicæ, beneath margined by a rounded corrugated spiral carina, beneath the carina profoundly canaliculate and pitted; base convex, sculptured with 6 rather close, roughly transversely plicated ribs, the interstices pitted; aperture subrotund, throat pearly, lirate; columella nearly straight, pearly, obscurely unituberculate. Alt. 20, diam. 19 mill. (*Sowb.*)

Hong Kong.

Turcica chinensis SOWB., P. Z. S. 1888, p. 569, t. 28, f. 8, 9.

Compared with *Turcica elisæ* A. Ad., the body-whorl is larger in proportion to the spire, the keel more prominent and the suture more deeply excavated. The whorls have two rounded nodulous keels, the space between which is smooth excepting for the fine oblique

striae. The base is strongly corded and deeply pitted. Of the only two specimens known one is in the National Collection at South Kensington, and the other is in that of Mr. MacAndrew. (*Sowb.*)

Genus BASILISSA Watson, 1879.

Basilissa WATSON, Jour. Linn. Soc. Lond., xiv, p. 593, April, 1879. Challenger Rept., Gasterop., p. 96.—DALL, 'Blake' Gasteropoda, p. 383.

Dr. Dall's diagnosis is as follows: Shell trochiform, umbilicate, nacreous, sculptured. Pillar concave, its distal end projecting as a strong tooth. Margin of the aperture concavely sinuate near the suture and on the base. Peripheral margin produced, claw-like, between the two shallow sinuations. A grooved or denticulate callous in the adult on the body-whorl and within the margin of the aperture. Aperture subrhomboidal. Operculum multispiral, horny, with a circular callous on the inner central face, and a sub-circular outline.

The above amended diagnosis is rendered necessary by the discovery of adult specimens among the Blake shells. It is probable that most of the species in an adult condition conform to it. It is conchologically related to *Sequenzia*, a transition form which is indicated by such species as *S. carinata*, *S. elegans*, and *S. trispinosa*. But the soft parts are as yet unknown. Should it be found however that some species do not exhibit the denticulation, etc., described in *B. costulata*, and conform to the edentulous type indicated in Watson's original description (and *B. alta* may prove to be of this character), these would of course retain the original name of *Basilissa*, while for the dentate forms the name of *Ancistrobasis* might be used. (*Dall.*)

Section BASILISSA s. s.

B. ALTA Watson. Pl. 36, fig. 5.

Shell an equilateral cone, flat-based, sharply angulated, small, thin, delicately sculptured, nacreous under a thin, white calcareous surface. Sculpture: there are longitudinals about 45, hair-like, strongly sinuated, flexuous, for they advance markedly at the periphery, where they are each ornamented by an elongated curved tubercle, and on the base they again retreat so as to form a sinus. On the earlier whorls these longitudinals are much more distinct than on the later, and each starts from a little bead, which lies

close to the suture, but these beads are very feeble on the last whorl. In the intervals of the longitudinals and parallel to them are very faint lines of growth. Of spirals there are above the carina two stronger than the rest, with a sharp intermediate furrow; above these are several hair-like lines, which become feebler toward the middle of the whorl and strong again above, the upper whorls presenting one in particular, which connects the row of infra-sutural beads. On the base below the carina are four narrow and sharp spirals, followed by about eight, which are broader and flattened, and within these is one stronger than the rest, with about sixteen rounded beads, which crenulate the edge of the umbilicus. The furrows between these basal spirals are cut into little oblong pits by the longitudinals. Color a dead creamy white, with the underlying nacre gleaming through. Spire high and conical. Apex flattened, with the minute, smooth, $1\frac{1}{2}$ embryonic whorl somewhat tumidly projecting. Whorls $8\frac{1}{2}$, of slow and regular increase. In the earlier whorls there is a slight-tumidity below the suture, a slight contraction in the middle, and a slight swelling around the base of each whorl. This last feature is feebly persistent in the later whorls, but otherwise these are flat in profile. There is a sharp carinated angle, and the base is almost flat, with an angled tubercled umbilical edge. Suture linear, almost invisible. Mouth perpendicular, somewhat rectangular, and broader than high. Outer lip sharp and thin, not patulous, not descending, with a rather deep but broad and open sinus at the suture, forming a slightly acute angle at the periphery, where it advances very markedly, retreating immediately to form a sinus on the base, where it is barely arched. Pillar-lip which is somewhat thickened, advances very little at its junction with the body, then retreats slightly so as to form a small sinus, bending at the same time a very little over the umbilicus. It has a sort of double point with a slight nick between them. It is very slightly reverted, and the umbilical groove behind it is very small. Umbilicus funnel-shaped, oblique-edged, crenate on the margin, and strongly scored within, and with an oblique spiral formed by the old points of the false pillar-end. Alt. .25, diam. .24 inch. (*Watson.*)

Off Culebra, W. Ind., 390 fms.; *near Guadeloupe*, 769 fms.; *near Grenada*, 416 fms.

B. alta WATSON, Journ. Linn. Soc. Lond. xiv, p. 597; Challenger Gasterop., p. 100, t. 7, f. 8, var. *oxytoma*, l. c., f. 8a.—DALL, Blake

Gasterop., p. 384.—*Sequenzia delicatula* DALL, Bull. M. C. Z. ix, p. 48, 1881.—*B. alta* var. *delicatula* DALL, 'Blake' Gasterop., p. 384, t. 22, f. 2.

Var. *OXYTOMA* Watson. Pl. 36, fig. 4. More distinctly sculptured.

Var. *DELICATULA* Dall. Pl. 48, figs. 3, 4. More delicate and thin than the type, but otherwise much like it, except that the delicate spiral threads cover the whole surface of the shell. (*Dall.*)

B. LAMPRA Watson. Pl. 36, figs. 10, 11.

Shell thin, white opalescent, smooth, faintly reticulated, with a high concave spire, sharp apex, acute carina, angulated umbilicus, and rhomboidal mouth. Sculpture: smooth, glossy, iridescent, with ten to twenty faint spiral threads on the upper side of the body-whorl; the last of these which joins the lip is much stronger than the others; a little remote and below is a thread forming the keel, below which, and nearer, are two other strong threads; round the umbilicus are also two strong threads; the intermediate space on the base is marked with eight to ten impressed spiral striae. The interstices of the spirals are crossed by longitudinals, which are regular, fine, hair-like but distinct and well parted; their curve on the surface below the suture shows the old sinus. On the base they are radiating and are crowded and irregular, except around the umbilicus where in the first two or three striae they are very sharp and distinct. On the upper whorls both the spirals and longitudinals are finer, but sharper than they are on the last. Color grayish, horny, translucent, opalescent white. Spire raised, with a concave outline. Apex, which consists of the single minute embryonic whorl, is slightly exserted and sharp; it is quite smooth, but the spirals and longitudinals begin sharply immediately below it. Whorls $6\frac{1}{2}$; the earlier ones are of slow and regular increase, depressed, quite flat on their side lines; the last widens rapidly, is slightly rounded above, and still more slightly concave on the base, with an acute, but still rounded keel. Suture impressed on the body-whorl, but on the upper whorls sharply, though slightly, marginated below. Mouth a little oblique, rhomboidal, the basal and palatal lines being nearly parallel, while the outer and inner lips diverge downwards. Outer lip thin, not patulous, not descending, advancing at its insertion, and then retreating so as to form a shallow, broad, open sinus a little below the suture, acutely but roundedly

angulate at the periphery, nearly flat on the base, with a very slight nick at the point of the pillar, where it joins the inner lip at a slightly obtuse angle. The pillar-lip is straight. It is very little thickened, and is slightly porcelaneous. It advances a little on the edge of the umbilicus; below this it is hollowed out by a receding curve, but advances again into a slight rounded projection just above its junction with the outer lip. In its whole direction it inclines slightly to the left. Umbilicus oblique-edged, funnel-shaped, being wide in the mouth and deep, with straight converging sides. It is slightly marked with lines of growth and a few faint spirals; while all the rest of the shell without and within is brightly opalescent, it is scarcely so at all.

Alt. .3, diam. .48 inch. (*Watson.*)

The specimen from which this species is described is full grown, and the animal is still within the shell, but the operculum is absent.

The species has a slight general resemblance to *Trochus* (*Solariella*) *aureonitens* A. Ad., but is utterly different, not only in its angulation, but in its sculpture. In form it slightly recalls *Zonites cellarius*, Müll. (*Watson.*)

Mid-Pacific, East of Japan, 2050 fms.

B. lampra WATS., Journ. Linn. Soc. Lond. xiv, p. 593; Challenger Gasterop., p. 97, t. 7, f. 5.

B. SIMPLEX Watson. Pl. 36, fig. 1.

Shell a rather narrow flat-based cone, sharply angulated, small, thin, delicate, smooth, glassy, nacreous under a thin white calcareous surface. Sculpture: there are longitudinals, which are faint, hair-like and sinuated, showing the old lines of growth. Of spirals, faint, rounded, and irregular, the whole surface has traces. At the bottom of each whorl is a flat puckered band about 0.01 inch broad, whose upper edge projects sharply, especially on the upper whorls, and whose lower edge is a slight narrow flange, which forms a sharp carina at the periphery. This band forms the upper border of the suture, which is further marginated below by two not continuous rounded threads occupying the top edge of each whorl. The base is covered by about fourteen rounded ridges and furrows, which are rather stronger toward the center, the last one, forming the edge of the umbilicus, being specially so. Color: the surface is a dead slightly creamy white, formed by a thin calcareous layer through which the underlying nacre shines. Spire high and conical. Apex

broken. Whorls 8 (reckoning the first two as broken), of slow and regular increase till the last, which enlarges rapidly; perfectly flat, with an upper and lower border, sharply angulated and carinated at the periphery, slightly convex but still very flat on the base, with a blunted angulated and carinated umbilical edge. Suture linear, almost invisible, margined above and below. Mouth perpendicular, rhomboidal, with the body-pillar and basal edges nearly equal, and the pillar and outer lip nearly parallel. Outer lip sharp and thin, not patulous, not descending, advancing at its junction with the body-whorl, then retreating so as to form the broad open sinus, acute angled at the periphery, slightly arched across the base, nicked close to the point of the pillar. Pillar-lip arched, strengthened by a thin pad; reverted on the umbilicus so as to leave a slight groove behind it, it has a slight tooth in front. From the body-whorl it bends very much over to the left, so as largely to cover the umbilicus, and then it curves over to the right to join the outer lip on the base at an obtuse angle. Umbilicus small, oblique edged, funnel-shaped, nearly covered by the pillar-lip, contracted within, scored with hair-like lines of growth.

Alt. .255, diam. .25, least breadth .2, penultimate whorl, .075. Mouth, height .12, breadth, .11 inch. (*Watson.*)

This is a narrower shell than *Basilissa alta* Wats., less ornamented and with a smaller umbilicus. Than *Basilissa munda* Wats., this is a narrower shell, the flexuous longitudinals are stronger, the supra-sutural bands are stronger, and in that species the infra-sutural band is wanting. (*Watson.*)

Off Mouth of La Plata, 1900 fms.

B. simplex WATS., J. L. S. L. xiv, p. 595; Challenger Rep., p. 98, t. 7, f. 6.

B. MUNDA Watson. Pl. 36, fig. 2.

Shell broadly conical, flat on the base, sharply angulated, small, thin, delicate, smooth, glossy, nacreous under a thin white calcareous surface. Sculpture: there are longitudinals which are very faint but still sharp, sinuated, showing the old lines of growth. Of spirals there are over the whole surface very faint traces. At the bottom of each whorl, about 0.01 inches above the suture, is a sharp narrow thread, which on the last whorl is bordered below by a second, rather higher and sharper, which forms the carina, and which on the spire is buried by the over-lap of the succeeding whorl. On the base

there are about eleven fine spirals, within which is a strong furrow, and a projecting, crenulated, or rope-like thread forming the edge of the umbilicus. Color opalescent, from the under-lying nacre shining through the polished, thin, translucent calcareous layer of the surface. Spire high and conical. Apex flattened, with a minute smooth embryonic $1\frac{1}{2}$ whorl slightly projecting. Whorls 6, of regular and slow increase (but the specimen is not full grown); in profile perfectly flat, the slope being scarcely broken by the supra-sutural thread. Suture linear, almost invisible. Mouth perpendicular, irregularly rectangular, broader than high. Outer lip sharp and thin, with a slight open sinus, sharply angled at the periphery, slightly arched across the base, apparently nicked at the point of the pillar. Pillar-lip arched, strengthened by a thin pad, reverted on the umbilicus so as to leave a groove behind, with a slight tooth in front. From the body it bends very much over to the left, so as largely to cover the umbilicus, it then advances straight and is toothed in front. Umbilicus small oblique-edged, with a crenulated margin.

Height .13 in., breadth .14, least .12; Penultimate whorl, .03. Mouth, height .06, breadth .05 inch. (*Watson.*)

Than *Basilissa simplex* Wats., this is a broader, smoother, less banded shell. Than *Basilissa alta* Wats., it is lower, less ornamented, with a much smaller umbilicus. (*Wats.*)

Off Palma, Canaries, 1125 fms.

B. munda WATS. J. L. Soc. Lond. xiv, p. 596; Challenger Rept., p. 99, t. 7, f. 7.

B. SUPERBA Watson. Pl. 36, figs. 6, 7.

Shell high, concavely conical, flat-based, sharply angulated, thin, finely reticulated, cream-colored. Nacre very faint. Sculpture: spirals—there are about twenty delicate threads, very nearly but not quite regular in thickness or distance, on the upper part of the last whorl; they slowly decrease in number on the previous whorls. The two (or three) which form the carina are thrown out a little on a projecting whitish fillet, which encircles the base of the whorls. This whitish fillet extends to the base, when it forms a narrow obliquely-corrugated edging. On the base there are about thirty spirals, more crowded, flattened, and irregular than above, and the edge of the umbilicus is defined by another whitish fillet, ornamented with about thirty oblong beads. One or two smaller and more faintly beaded threads lie within the edge of the umbilicus.

Longitudinals—there are of these on the last whorl about 120; flexuous, marking the lines of growth, rather stronger, more regular and more distant than the spirals, which run over the top of them and form little white nodes at the crossings. The intersections of these two systems cut the whole surface into rhombic reticulations, whose breadth is about 0.011 and their height 0.006. The longitudinal threads themselves are about 0.005 and the spirals about 0.003 broad. On the base the longitudinals are flattened and spread out into undulations. Color creamy, on a dull polished surface, with a faint nacreous gleam which is pearly within the mouth; the apex is ruddy. Spire high and conical with slightly concave slopes; apex broken. On the upper whorls the longitudinals are strong, while the spirals are obsolete, except the carinal fillet, which projects bluntly above the suture. Whorls about 14, of very regular increase, very slightly convex, sharply acute-angled at the carina; on the base, flat at the outer edge and barely convex in the middle, with a slight dip in toward the edge of the umbilicus which is strongly defined. Suture linear, defined by the white carinal fillet, and also on the lower whorls by being very slightly impressed. Mouth perpendicular, rhomboidal, the basal and palatal lines being parallel, the other two are somewhat diverging and curved, broader than high. Outer lip sharp and thin, not patulous, not descending, with a shallow open sinus below the suture, then, about the middle of the whorl, it advances with a rounded sweep, retreating sharply across the carina to form the open rounded basal sinus toward the outer edge of the base. Pillar-lip sharp and thin; it rises from the body a good way within the edge of the umbilicus. It retreats so as to form a sinus, and then it bends over a little on the umbilicus, and it forms a sharp angle projecting into a tooth at the extreme point of the pillar. Umbilicus strong, deep, abrupt, there being on the base only a very slight dip in toward it and it is defined by the white-beaded fillet. Within, besides the two spiral lines, there are slight longitudinal striations, and the inner edge of the whorls twines like a stair case round it, but concealed by the overcurve of the pillar-lip. Alt. .75 in. diam. .65, least .6 inch. (*Watson.*)

The form of this shell connects it with *B. alta*, *B. simplex*, and *B. munda*, and it distinctly has the sinuses of the genus: the layer of nacre is very faint; there is, however, a gleam of it through the surface-layer, and within the mouth, in a favorable light and protected from light coming through the shell, there is a distinct

pearly luster. It has some resemblance to *Eutrochus gemmatus*, Reeve, in form and in its gemmed umbilicus; and though much higher and more conical, recalls the *Solaria* of the group *Torinia* (Gray), especially *Solarium trochoides* Desh. (Wats.)

E. of Cape York, Australia, 1400 fms.

B. superba WATSON, Jour. Linn. Soc. Lond., xiv, p. 598; Challenger Report, Gasterop., p. 101, t. 7, f. 10.

B. OXYTROPIS Watson. Pl. 36, figs. 8, 9.

Shell small, high, conical, scalar, with a sharp, expressed carina at the periphery and a second carina above, angulating the whorls. Sculpture: there are a few close-set slight spirals on the edge of the flat base; there are many not close-set, flexuous, longitudinal ribs above the periphery, but on the base merely lines of growth. These ribs in crossing the upper carina form small sharp-pointed tubercles, of which there is also a trace on the lower carina. The superior sinus lies just above the upper carina, the basal sinus toward the middle of the base; both are well marked. The apex is small and flat, the smooth embryonic $1\frac{1}{4}$ whorl hardly rising at all. The whorls are of slow increase. The pillar is perpendicular, with a strong rounded sinus, which corresponds to a swelling within the umbilicus. The umbilicus is not large, but deep, funnel-shaped, with a puckered sharp edge. In both specimens there are $5\frac{1}{2}$ whorls to a height of .05 and a breadth of .055 inch.

This species, which is not full grown, slightly resembles *B. alta* and var. *oxytoma* Wats., but is more depressed; the carina is sharper and is double, and the longitudinal ribs are very much stronger. Than *B. costulata* Wats., this species is smaller, higher, more conical, and it is scalar; the whorls are more carinated above, and the peripheral carina is much more projecting; the apex is minuter and sharper, though the embryonic whorl is less raised, the base is smooth but for the marginal spirals; the umbilicus is smaller. Compared to *B. reticulata* (*Solarium*), Phil., it has a less expressed carina, and the whorls are not angulated in the middle. (Watson.)

B. oxytropis WATS., Journ. Linn. Soc. Lond. xiv, p. 693; Challenger Report, Gasterop., p. 104, t. 7, f. 9.

Section ANCISTOBASIS Dall, 1889.

B. COSTULATA Watson. Pl. 36, fig. 3.

Shell small, depressedly conoidal, sharply angulated, flattish on the base, sharply and deeply umbilicated, a little porcelaneous,

flexuously ribbed. Sculpture: the whole surface is covered with longitudinal flexuous ribs, which are narrow, sharp, and uniform; each of these is about 0·002 in. broad, and they are parted by intervals which at the suture are twice and at the periphery thrice as broad as the ribs. There are about forty of these on the last whorl. They are crossed by spirals, half the breadth of the ribs, running across the intercostal spaces and forming knobs on the ribs. Of these spirals there are about seventeen on the last whorl, much closer set and less uniform than the ribs; in particular the carinal spiral, which is very sharp, and the fourth and seventh above it, are stronger than the others; the last mentioned of these is especially so on the earliest whorls. On the base the longitudinals though continued even into the umbilicus, become much less prominent and are no longer nodose; and the spirals, of which there are about fifteen, are closer set, broader and flatter, except the first three below the carina, which are sharp and narrow. The whole base is pit-marked from the spiral interstitial furrows being cut up by the longitudinals. Color dead white (on the base a little glossy) on the thin porcelaneous surface, through which the nacreous layer behind gleams. Spire raised, with a very slightly concave outline. Apex, which consists of the minute smooth embryonic whorl and a half, is itself a little flattened, but rises sharply above the sculptured surface of the succeeding whorls. Whorls $5\frac{1}{2}$, of slow and regular increase till the last, which begins to enlarge rapidly; they are slightly rounded above, very sharply angulated at the keel, and flattened on the base, with a bluntly angulated umbilical edge. Suture distinct, slightly impressed. Mouth perpendicular, square. Outer lip sharp, thickened by a slight internal remote callus, not patulous, not descending, advancing at its junction with the body-whorl and then slightly retreating so as to form the very shallow open sinus; right-angled at the periphery, flat on the base, where it retreats so as to form two rounded sinuses, making with the pillar an angle that is scarcely obtuse. Pillar-lip is straight, a little thickened and reverted, so as to leave a slight groove behind it. It advances on the body-whorl, then retreats so as to form a feeble sinus, bending at the same time shortly but sharply to the right into the umbilicus and then advancing straight forward, but a little toward the left, to its junction with the outer lip at the base. Umbilicus funnel-shaped, open-mouthed, oblique-edged, straight-sided, deep and contracted internally. Its edge is sharply defined by a spiral thread, and is obliquely scored by the

longitudinal ribs; farther in its walls are marked by hair-like lines of growth and faint spirals.

Alt. .12 in., diam. .14, least .11; penultimate whorl, .23. Mouth, height .063, breadth .061 inches. (*Watson.*)

This species slightly resembles in sculpture the young of *Margarita striata*, Brod. (= *Trochus cinereus*, Couth., nec Da Costa), but in all details of form and ornamentation is very different. From *Trochus amabilis* Jeffr., besides the generic features, it differs in the depressed spire, in the absence of the deep-cut suture, in the flatness of the base, and in all the features of minute sculpture. From *Basilissa reticulata* (*Solarium*), Phil., it differs in being much rounder on the base, blunter at the edge of umbilicus and at the carina, and in being much less delicately sculptured. (*Watson.*)

Gulf of Mexico, 15-640 fms.

B. costulata WATSON, Jour. Linn. Soc. Lond. xiv, p. 600; Challenger Gasterop., p. 103, t. 7, f. 11.—DALL, Bull. M. C. Z. ix, p. 48, 1881.—*B. (Ancistroba-is) costulata* Wats., var. *depressa* DALL, 'Blake' Gasterop., p. 384, t. 23, f. 4, 4a.

Var. *DEPRESSA* Dall. Pl. 60, figs. 14, 15.

The shell figured differs from *B. costulata*, as described and figured by Watson, in the less flexuous radiating costæ, which are nearly equal to the interspaces in width, and in the smaller number of spiral ridges, which are about ten on the base and seven to nine on the upper surface of the whorls. The armature of the mouth is a character which does not appear until full maturity, so that I do not regard its non-existence in the Challenger specimens as important. The other characters seem to agree closely with Watson's figure and description, and, taking into consideration the known variability of the abyssal shells and among the Blake specimens of this species, I do not feel justified in separating the Blake shells specifically from *B. costulata*. If I am correct in the identification, this material enables me to add a good deal to the knowledge of the species and genus. The dried remains of the animal in one specimen bear a pellucid multispiral operculum a little more circular in outline than that of *Seguenzia*, but otherwise precisely like it.

The aperture in the adult is strongly thickened a little distance within its margin, which remains sharp. The projecting peripheral part is a little bent in, recalling the aperture of *Seguenzia*. The

callus on the body is thin and smooth, that within the outer lip is broad, thick, iridescent, and deeply grooved parallel with the external spirals, producing four or five ridges between the grooves above the carina and a large number of rather smaller ones below it. The columella is thickened concave and strongly reflected, its basal extreme terminating in a stout tooth-like twist of the margin, beyond which is a deep sulcus in the callus extending nearly across the base, in the middle of which rises a solitary stout tooth-like ridge. The walls of the umbilicus are nearly smooth, and as regards the individual turns are somewhat concave. The nucleus in this form gives the impression, after a very close scrutiny of several fresh specimens, that it is really laid at right angles to the original axis and half immersed in the first post-nuclear turn. This is masked by the fact that the nucleus proper occupies less than a single turn, and appears thus more normal than it really is, if my suspicions are correct.

Genus EUCHELUS Philippi, 1847.

Euchelus PHIL., Zeitschr. f. Mal. 1847, p. 20, type *Monodonta tricarinata* Lam.—*Aradasia* GRAY, Figures of Molluscan Animals, iv, p. 90, 1850, type, *E. canaliculatus* Q.,—*atratus* Gm.—*Huttonia* KIRK, Trans. N. Z. Inst. xiv, p. 282, 1882, type, *E. bella* Hutton.—*Monodonta* and *Trochus* in part, of authors.

I include as subgenera, *Tallorbis* Nevill and *Danilia* Brusina, both with considerable hesitation. Of the first I have seen no specimen; the latter is well-known as far as the shell is concerned; it has a corneous *multispiral* operculum; the columella twisted above as in typical *Turcica* or *Clanculus*. Its sculpture is like *Euchelus* or *Perrinia*. The varixed lip is unique in Trochidæ. Fischer includes it as a subgenus under *Clanculus*—a position as likely to be correct as that here taken.

The affinities of *Euchelus* are not very clear. There is a certain resemblance in aperture and columella to *Clanculus*, and the deflection of the whorl at the aperture, rather an unusual character in Trochidæ, also favors that genus. There is much likeness to *Perrinia*, too, in sculpture and aperture, but that group certainly belongs to *Turcica* as a section, and seems to be close to *Calliostoma*.

The following well-defined natural sections may be recognized:

EUCHELUS s. s. Shell turbinate-conic, solid, with thick lip; spire elevated; operculum with few whorls, like that of *Littorina*; colu-

mella with a tooth near the base, sometimes a notch below it. *Huttonia* Kirk, is synonymous.

HERPETOPOMA Pilsbry. Shell turbinate-conic, etc., as in *Euchelus*; spire elevated; operculum multispiral as in typical Trochus. Type, *E. scabriusculus* Ad.

HYBOCHELUS Pilsbry. Shell depressed, with very short spire and large body-whorl; outer lip not thick; columella simply concave, not in the least toothed or notched, somewhat reflexed above; operculum unknown. Type, *E. cancellatus* Krauss.

The sculpture in *Euchelus* consists of spiral ribs crossed by elevated striae, which bead them and cut the interliral furrows into pits, or frequently are nearly obsolete in the furrows. The spirals increase in number by the interpolation of tiny interstitial riblets, which increase in size until they become equal to the primary spirals. It follows that a species having equal ribs on the last part of the body-whorl, has alternately larger and smaller ones on the penultimate whorl, and usually equal ones again on the next earlier. Species like *Euchelus principalis*, with numerous equal riblets in the adult, have fewer *unequal* ones when young. The imperforate forms are always (so far as I know) decidedly umbilicate when young. The above remarks on the development of spirals apply to most forms of Trochids in which each interstitial furrow gives rise to a single secondary riblet; those forms which develop numerous spiral striae in each inter-liral space (*Clanculus plebeius*, *Chlorostoma maculostriatum*, etc.), will always be found to be excessively variable in the number of more prominent spirals. There are other forms, as *Calliostoma lima*, in which there are three or four orders of spirals; for example, the 1st, 5th, and 9th liræ may be largest and equal; the 3d and 7th smaller, 2d, 4th, 6th, 8th still smaller. These species, following a certain mathematical method, are somewhat constant. It only remains to note those like *Perrinia elisa*, *P. maculata*, etc., which have the same number of spirals on all the whorls, no interstitial riblets being developed. In these the number of spirals is very characteristic.

Section EUCHELUS s. s.

E. QUADRICARINATUS Chemnitz. Pl. 38, figs. 9-11.

Shell globose-conic, imperforate, strong, solid, pinkish fawn-colored with numerous obliquely descending black stripes, often broken into dots. Spire short, conic; sutures impressed; whorls 5, rounded, encir-

cled by numerous unequal beaded spirals, of which two are more prominent on the upper, 3 or 4 on the body-whorl. Typically, these more prominent ones are elevated into spiral lamellæ, but they are often not greatly larger than the others. There are generally about 12 spirals on the penultimate whorl. Body-whorl globose, convex; aperture rounded, outer and basal lips thick, finely crenulate, finely plicate inside; columella concave, its edge smooth, and bearing a small denticle near the base, excavated at the position of the closed umbilicus, and rugose. Alt. 23, diam. 23 mill.

Indian Ocean.

Trochus quadricarinatus CHEMNITZ, Conchyl. Cab. xi, p. 167, t. 196, f. 1892, 1893 (1795).—*Monodonta tricarinata* LAM., An. s. Vert. vii, p. 36.—DELESSERT, Rec. de Coq., t. 36, f. 8.—*Trochus tricarinatus* Lam., PHIL., Conchyl. Cab., p. 171, t. 27, f. 8.—FISCHER, Coq. Viv., p. 287, t. 93, f. 1.—*Trochus oxytropis* PHIL., Zeitschr. f. Mal. 1848, t. 39, f. 1.

The typical form is that represented in fig. 9. Figures 10 and 11 represent less strongly characterized shells. The latter approach *E. asper*, and may be found to be connected by intermediate forms.

Tr. oxytropis Phil. (pl. 37, figs. 14, 15), seems to be merely a young specimen of the typical form. Fully adult *quadricarinatus* seems to be always imperforate, but specimens with a small umbilicus may occur. (*Vide* Fischer, *loc. cit.*). Young shells have a large, deep umbilicus.

E. ASPER Gmelin. Pl. 38, figs. 13, 14.

Shell imperforate in adult specimens, conoidal, thick, dull ashen, dotted with brown, rosy, and black; whorls $5\frac{1}{2}$ –6, convex, separated by profound sutures, the first eroded, the rest rough, ornamented with close, granulose, unequal cinguli, two on the upper, 3 or 4 on the last whorl more prominent; penultimate whorl with 12–15 liræ; last whorl globose rounded, descending, convex beneath; aperture ovate-rounded, the margins nearly continuous, plicated finely all around, columella arcuate, base dentate. Alt. 26, diam. 24 mill.

Indian Ocean.

Trochus asper GMEL., Syst. Nat. xiii, p. 3583.—PHIL., Conchyl. Cab., p. 172, t. 27, f. 11.—FISCHER, Coq. Viv., p. 291, t. 94, f. 1.—*E. proximus* A. AD., P. Z. S. 1854, p. 316.

Probably the last is a form of this species. Typically, *asper* is more elevated with smaller, more numerous spirals. I have given

Fischer's diagnosis of the typical *asper*. A specimen before me marked *E. proxima* A. Ad. is evidently synonymous.

E. CIRCULATUS Anton. Pl. 37, fig. 16.

Shell ovate-conoidal, umbilicate, reddish, granulate-cingulate, sculptured with 4 large elevated distant cinguli on the penultimate, 9 on the last whorl; aperture semi-orbicular, silvery; throat with elevated lines not attaining the edge of lip; columella denticulate at base. Separated from *T. atratus* by the color and number of cinguli; from *pullatus* by the same characters and the elevated lines in the throat. Each whorl is very convex, cylindrical; the uppermost spiral is distant from the simple suture; all of them are strongly elevated, beautifully grained by elevated, oblique, fold-like incremental striæ. In most of the interstices there are one or rarely two elevated, grained, lines. The color is pale reddish-brown, the liræ articulated whitish and red-brown. The outer lip has furrows inside, corresponding to the external liræ, and numerous elevated riblets. Perhaps these riblets are the concomitant of old age, and all specimens lacking them are still immature. My material does not permit me to decide this question.

Alt. 15, diam. 16 mill. (*Phil.*)

Habitat unknown.

Tr. circulatus ANTON, Zeitschr. f. Mal. 1848, p. 103.—PHILIPPI, Conchyl. Cab., p. 264, t. 39, f. 4.

E. INCISUS (Mke.) Philippi. Pl. 37, fig. 6.

Shell globose-conoidal, narrowly umbilicate, rosy-whitish, subtessellately painted with purplish-brown spots; whorls cylindrical, separated by canaliculate sutures, sculptured with strongly elevated, profoundly crenated cinguli, 4 larger ones on penult., 9 on last whorl; aperture semioval, columella straight, with a denticle; lip crenate by the terminations of liræ, smooth inside.

On the penultimate whorl I count 4 strongly elevated very prettily grained liræ of equal size. The first stands far from the suture, which is broadly channelled; the two following inter-liral spaces are narrower than the liræ, the two next following are wider and have a little grained riblet. The last whorl has 9 large and 5-6 smaller liræ. The throat is scarcely sulcate inside, the outer lip thick, not denticulate, only furrowed to correspond with the external liræ; otherwise the mouth is just as in *T. atratus*. The coloration is

very pretty, the spirals causing the large purple-brown spots to appear tessellated on a light reddish ground.

Alt. 12, diam. $13\frac{1}{2}$ mill. (*Phil.*)

Habitat unknown.

Tr. incisus MENKE (*in litt.*) PHILIPPI, *Conchyl. Cab.*, p. 175, t. 27, f. 16.

E. HORRIDUS Philippi. Pl. 37, fig. 17.

Shell globose-conoid, perforate, transversely carinate and granulose-sulcate, reddish, maculated with brown and white; last whorl encircled by 3 carinæ, their interstices with one or two cinguli; lip thick, obtuse.

The shell is globose-conoid, acute, with 5 very strongly convex whorls, the last as long as the spire; this has 3 prominent rounded or cord-like granose keels, above the first of them 5 granose liræ; one or two similar grained threads stand between the first and second and the second and third keels, and below the latter there are about 8 cinguli. The aperture is egg-shaped, higher than broad, the outer lip simple, denticulate, silvery; columella vertical, even, with a slight denticle. Umbilicus cylindrical but very small. Color reddish-gray, with white and black spots. Separated from *T. tricingulatus* by the small size, umbilicus, convex whorls, and the smaller number of granose liræ. Alt. 12, diam. $12\frac{2}{3}$ mill. (*Phil.*)

Pacific Ocean,

Tr. horridus Phil., *Conchyl. Cab.*, p. 172, t. 27, f. 12.

E. PULLATUS Anton. Pl. 38, fig. 4.

Shell globose-conic, solid, thick, imperforate when adult, umbilicate in the young, whitish or yellowish, marked longitudinally with narrow black stripes, or series of black spots on the spirals; whorls about $5\frac{1}{2}$, convex, encircled by numerous spiral liræ, clathrate with regular, elevated lamellæ of growth, especially prominent between the liræ; spiral liræ 9 or 10 on the penultimate whorl, every alternate one slightly larger; on the last whorl there are about 16 to 18 liræ. The suture is very narrowly canaliculate. Aperture about half the length of shell, rounded, silvery inside, and sulcate; lip thick, crenulated; columella slightly curved, with a slight tooth at base. Alt. 19, diam. 17 mill.; alt. 21, diam. 19 mill.

Persian Gulf; Red Sea.

Trochus pullatus Anton, *Zeitschr. f. Mal.* 1848, p. 123.—PHILIPPI, *Conchyl. Cab.*, p. 263, t. 39, f. 3.—FISCHER, *Coq. Viv.*, p. 407, t. 120, f. 1.

Allied to *E. asper*, but with fewer, larger cinguli. The coloration of black stripes or spots on a yellowish (or white) ground is characteristic.

E. STELLIO Fischer. Pl. 38, fig. 23.

Narrowly, obliquely perforate, conoid, thick, chestnut colored, dotted with white, reddish and black; whorls 5, convex, separated by an impressed suture, the first smooth, following rough, spirally cingulate, the cinguli granose, unequal, 5 more prominent ones on the penultimate whorl, with smaller intermediate granose liræ; last whorl rounded; aperture ovate, lip plicate within; columella arcuate, simple, edentulous. Alt. 16, diam. 16 mill. (*Fischer.*)

Habitat unknown.

Trochus stellio FISCHER, Journ. de Conchyl. 1878, p. 63; Coq. Viv., p. 290, t. 93, f. 3.

This does not seem to be a wholly adult shell. The description and figure recall to me immature specimens of *E. pullatus*.

E. PRINCIPALIS Pilsbry. Pl. 67, fig. 83.

Shell large, globose-conic, very thick and solid, imperforate, uniform ashen; spire short, acute, each whorl with a delicate carina immediately above the narrowly channelled suture; whorls 5 to 6, convex, covered with minutely granose, spiral riblets, slightly unequal in size, but none of them prominent, the interstices seen under a glass to be densely lamellose-striate; penultimate whorl with about 18-20 spirals. Last whorl large, globose, rounded, descending toward the aperture, base convex; aperture rounded, quite oblique, silvery within; outer lip very thick, finely crenulated, columella curved, ending in a small tooth; columellar lip continued across the parietal wall in a thin wrinkled layer, the peristome in adult shells crenulate or wrinkled all around.

Alt. 27, diam. 24 mill.; alt. 25, diam. 22 mill.

Habitat unknown.

This is the largest form of *Euchelus* I have seen. The sculpture consists of fine, beaded riblets, slightly unequal in size, much smaller than in *E. atratus* or *E. asper*. The whole shell is more regular in outline and smoother than the latter species. Two specimens of unknown origin are before me. I cannot tell whether this has been described by A. Adams or not. His descriptions are wholly insufficient for identification.

E. BACCATUS Menke. Pl. 62, figs. 72, 73.

Shell globose-conic, imperforate, solid, pinkish, with sparsely scattered reddish or blackish dots. Spire elevated, conical, constricted by deep, canaliculate sutures; whorls 5, convex, encircled by closely beaded *equal* spirals, the interstices lamellose-striate; spirals (typically) 9 on the penultimate whorl, 17 on the last, including base. Body-whorl rounded; aperture rounded, lip thick, crenulate inside, columella concave, terminating in a minute tooth, and bounded by a longitudinal groove.

Alt. 11, diam. $9\frac{1}{2}$ mill.; alt. 13 diam. 13 mill.

S. Australia; Singapore; Solomon Is.

Monodonta baccata MKE., Moll. Nov. Holl., p. 14.—*Tr. baccatus* Mke., PHIL., Conchyl. Cab., p. 173, t. 27, f. 13.—FISCHER, Coq. Viv., p. 292, t. 94, f. 2; t. 115, f. 1.—*Trochus aspersus* KOCH, Zeitschr. f. Mal. 1846, p. 103.

There is considerable variation in degree of elongation, some shells being high, subscalariform. These have received the varietal name of *solutus* Fischer (pl. 38, fig. 17). The number of liræ on the penultimate whorl, their equality in size, and the coloration, are the more salient specific characters.

E. BELLUS Hutton. Pl. 67, figs. 80.

Shell small, globose-conic, solid, thick (blackish or) pink varied with darker; imperforate when adult, with a groove at the place of the umbilicus. Spire short, conic; apical whorl smooth, the following whorl with three granose liræ, the next with 3 or 4; the penultimate has 7 or 8 equal, grained liræ, the interstices narrow; last whorl with ten such liræ. Whorls 5, convex, the last globose, descending at the aperture. Aperture rounded, nacre with steel-blue and dark red reflections, lirate inside; *columella concave*, terminating in a tooth, below which there is a narrow notch, and another tubercle or tooth on the basal lip equal in size to the columellar denticle.

Alt. $6\frac{1}{2}$, diam. $6\frac{1}{2}$ mill.

New Zealand; Chatham Is.; Tasmania.

E. bellus HUTTON, Cat. Mar. Moll. N. Z., p. 37, 1873; Proc. Linn. Soc. N. S. Wales ix, p. 357, 1884; Trans. N. Z. Inst. xv, t. 14, f. 1 (operculum and dentition).—*Huttonia iricolor* KIRK, Trans. N. Z. Inst. xiv, p. 282, 1882.

A globose little shell, evenly grained all over.

Var. *IRICOLOR* Kirk. Granules coarser; dirty chocolate, interior bluish-green.

E. HAMILTONI Kirk, *Unfigured*.

Shell perforate; spiral granular ribs very fine; color white or faint pinkish-white, with points of darker color forming diagonal lines across the whorls; apex white; inside white. (*Kirk*.)

Wellington, New Zealand.

Huttonia hamiltoni T. W. KIRK, Trans. N. Z. Institute xiv, p. 283, 1882.—*Euchelus hamiltoni* Kirk, HUTTON, Proc. Linn. Soc. N. S. Wales ix, p. 358, 1884.

May prove the same as the following.

E. TASMANICUS Tenison-Woods. *Unfigured*.

Shell small, depressedly turbinate, fleshy white, spotted with red points which are sometimes disposed in oblique lines; whorls 4, slopingly rounded, thickly gemmed with granulous liræ, the interstices plaited lengthwise, with a channelled impression at the sutures; aperture obliquely ovate, subcircular, outer lip lirate within, inner lip bisulcate and obliquely sulcate behind the columella. This somewhat gibbous *Euchelus* appears to have traces of nacreous iridescence internally. It is very distinct in size (being the smallest of our species) from *E. baccatus* Mke., though somewhat near shape and color. Rather scarce. Diam. maj. 6, min. 5 mill. (*Tenison-Woods*.)

Long Bay, Bruni Island, and S. Coast, Tasmania.

E. tasmanicus TEN.-WOODS, Proc. Roy. Soc. Tasm. 1875, p. 152 (1876).

Known to me only by the above description.

E. FOVEOLATUS A. Adams.

Shell small, globose-conic, solid, white, very minutely perforated; spire short; whorls about 4, convex, encircled by strong spiral ribs, the interstices between them deeply, coarsely pitted by the prominence of strong, regular, longitudinal lamellæ, continuous over the spirals. The penultimate and next earlier whorls have 3 spirals (the sub-sutural one sometimes subobsolete), the outer lip inserted upon the fourth; on the last whorl near the aperture there are 7, but sometimes more, by reason of the interpolation of one or two interstitial riblets on the upper surface; two or three submedian ribs are generally more prominent. Sutures canaliculate. Aperture rounded,

columella slightly concave, rather wide, flat, not toothed at base. Umbilical perforation minute. Alt. 6, diam. $5\frac{1}{2}$ to 6 mill.

Lord Hood's Id.; Paumotus; Viti Is.; Philippines.

Monodonta foveolata AD., P. Z. S. 1851, p. 176.—*Euchelus angulatus* PSE. Amer. Journ. Conch. iii, p. 283, t. 23, f. 27 (1867).

A very distinct little shell, with coarsely latticed sculpture. Part of the specimens before me are imperforate.

Var. *ANGULATUS* Peasé. Pl. 38, fig. 1.

More elongated and conical; last whorl biangulate by the prominence of two median liræ, the liræ above these small or subobsolete.

Alt. 5, diam. $4\frac{1}{2}$ mill.

Id. Annaa.

This variety is imperforate when adult.

E. PAUPERCULUS Lischke. Pl. 63, figs. 20, 21.

Shell small, conical, solid, thick, imperforate, white, spotted on the ribs with blackish-brown; spire conical; sutures slightly channelled; whorls 5, convex, encircled by strong spiral ribs, the interstices clathrate, pitted by longitudinal lamellæ. Spiral ribs 3 to 5 on the penultimate, 8 or 9 on the last whorl; aperture rounded, thickened and crenulate inside; columella straight, broad, not toothed.

Alt. $5\frac{1}{2}$, diam. 5 mill.

Japan.

Trochus pauperculus LISCHKE, Mal. Blätter xix, p. 105 (June, 1872); Jap. Meeres-Conchyl., 3d pt., p. 69, t. 4, f. 9–11.

Similar in form, size and sculpture to *E. foveolatus*, but variegated with blackish, imperforate, with straighter columellar edge.

E. SCROBICULATUS Sowerbie. Pl. 38, figs. 2, 3.

Shell imperforate, ovate-conic, subventricose, apex rather obtuse, dull white, ornamented with strong spiral subnodose ribs, decussated by elevated rib-striae cutting the interstices into square pits, of which there are 3 or 4 series on the third whorl, 4 on the penultimate, and 7 on the last; whorls 5, rounded, separated by a deep, subcanaliculate suture; aperture rounded, oblique, sub-pearly, lip duplicate, edge acute, crenulated, sulcate inside, columella vertical, simple. Alt. $6\frac{1}{4}$, diam. $5\frac{1}{2}$ mill. (*Sowerbie.*)

Island of Art, New Caledonian Archipelago.

Trochus scrobiculatus SOUV., Journ. de Conchyl. 1866, p. 140, t. 11, f. 9.—SOVERBIE in FISCHER, Coq. Viv., p. 248, t. 84, f. 2.

Evidently closely allied to *E. foveolatus* and *E. pauperculus*, perhaps only a variety of the former.

E. SMITHI Dunker. Pl. 38, figs. 5, 6, 7.

Shell umbilicate, globose-conic, whorls 6 or 7, encircled by numerous unequal, grained, partly pearly riblets; base convex, sculptured with smoother riblets, their interstices cancellated; umbilicus deeply channelled; aperture rounded-quadrate; columella deeply sinuous, callous, terminating in an acute denticle; lip sulcate within, subcinereous or ashen-reddish, with scattered obscure spots on upper whorls; lip thickened in adults, silvery-pearly.

Alt. 15, diam. 20 mill. (*Dkr.*)

Wakayama, Japan.

Euchelus smithi DKR., Ind. Moll. Mar. Jap., p. 259, t. 6, f. 16-19, 1882.

Seems quite different in form from other *Euchelus*.

E. BRONNI Dunker. Pl. 57, fig. 16.

Shell globose-conoid, perforate, brownish and white variegated; whorls 6, convex, the last subangulate toward the base; base plano-convex; umbilicus narrow, crenated; aperture subrotund; lip costate within; columella oblique, terminating in a thick tooth.

Alt. 6, diam. 8 mill. (*Dkr.*)

Japan.

Monodonta (Euchelus) bronni DKR., Mal. Bl. vi, p. 229; Moll. Jap. p. 22, t. 3, f. 8.

E. SEYCHELLARUM Nevill. Pl. 57, fig. 13.

Shell small, depressed-conical, subglobulose, white, rather solid; whorls 4, a little convex, joined by impressed suture, ornamented by spiral closely, minutely granulose riblets; last whorl rounded at the periphery; base convex, spirally granulate-ribbed, narrowly umbilicate; aperture subrotund; lip regularly arched, its edge rather obtuse, sulcate inside; columella straight, obliquely sloping, with a small tooth below. Alt. $2\frac{1}{2}$, diam. 3 mill. (*Nevill.*)

Id. of Mahé, Seychelles.

Euchelus seychellarum G. and H. NEVILL, Journ. Asiat. Soc. Beng. xxxviii, pt. I, p. 157, 1869.

E. SCABER Fischer. Pl. 38, fig. 8; pl. 57, fig. 23.

Shell globose-conoid, solid, umbilicate, whitish, with large maculations of reddish and darker dots of the same on the line; spire short,

conic, apex subacute, first whorl smooth, remaining whorls conspicuously lirate; penultimate and whorls of the spire with 3 prominent spiral ribs, the first bounding the broadly canaliculate suture, followed by 2 minute spirals, the second and third separated by a space which has a central riblet; on the last whorl there is another prominent spiral rib just below the periphery; the base has about 8 alternately larger and smaller spirals; the entire surface is covered with close, sharp, elevated vertical striae crenulating the ribs and interstices. Last whorl rounded; aperture large, quite oblique, expanded, finely sulcate within; columella subvertical, decidedly receding, nearly straight, a trifle reflexed above, and bearing a small denticle near the base, below which it is obscurely crenulated.

Alt. 16, diam. 16 mill.

Singapore ! (Archer); Indian Ocean.

Trochus scaber Chemnitz, FISCHER, Coq. Viv., p. 288, t. 93, f. 2.—(? *Trochus scaber* CHEMNITZ Conchylien Cab. v, p. 107, t. 171, f. 1667; 1781).—*Tr. scaber* Linn.? PHILIPPI Conchyl. Cab., p. 262, t. 39, f. 2.—(? *T. scaber* LINNE Syst. Nat. x, p. 758.)

As a temporary expedient I have taken Fischer's name for this shell, giving *himself* instead of Chemnitz as authority. I do this because it seems to me scarcely possible that it is the form named by Chemnitz. I believe Philippi's "*? T. scaber* L." to be the same, but am not at all sure it is the *T. scaber* of Linné. I would suggest that Chemnitz's and Linné's names be allowed to lapse as wholly unidentifiable; Philippi's *scaber* is somewhat doubtful; but as Fischer has given an unmistakable portraiture of a distinct, well-marked species, I am willing to consider his decision final. However this question may be settled, I have before me specimens of the shell agreeing with those so well figured and described in Fischer's magnificent monograph. It is quite a different thing from *E. quadricarinatus* Chem., belonging perhaps rather near to the group of *fossulatus*, *cancellatus*, etc., species of much the same general aspect.

E. ATRATUS Gmelin. Pl. 38, fig. 22. Vol. X, pl. 41, figs. 25, 26.

Shell umbilicate, globose-conic, solid; color black, brown, or grayish-pink, either unicolored or tessellated with dark spots; spire short, conic; sutures deeply canaliculate; whorls 5-6, convex, encircled by numerous equal, densely, finely beaded spiral ribs, with deep interstices, in each of which an interstitial riblet arises on

the last part of the body-whorl; spiral ribs on the penultimate whorl 7 to 9; on the last whorl 12, exclusive of the interstitial riblets; last whorl rounded, convex, quite abruptly and decidedly descending at the aperture; aperture rounded, strongly, finely sulcate inside; columella straight, with a small projecting tooth at base; umbilicus deep, bounded by a strong white rib, about 1 mill. diam.

Alt. 13, diam. 12 mill. Alt. 20, diam. 19 mill. Alt. 23, diam. 20 mill.

Viti Is.; Nicobar Is.; Vanikora; Fiji Is.; Moluccas; Sorong; Singapore; Philippines.

Turbo atratus GMEL., Syst. Nat. xiii, p. 3601.—*Trochus atratus* Gm., PHIL., Conchyl. Cab., p. 174, t. 27, f. 14.—FISCHER, Coq. Viv., p. 293, t. 94, f. 3.—*Monodonta canaliculata* LAM., An. s. Vert. vii, p. 37.—DELESSERT, Rec. de Coq., t. 37, f. 1.—*Tr. canaliculatus* Q. et. G. Voy. de l' Astrol., iii, p. 261, t. 64, f. 21–25.—*Euchelus canaliculatus* Lam., CHENU, Manuel, f. 2656.—*Euchelus denigratus* Chem., H. & A. AD., Genera, t. 47, f. 6.

The above description and first measurements correspond with the majority of shells before me. Larger specimens (16–23 mill. alt.) are paler, and have a small riblet developed in each interstice, thus about doubling the number of spirals.

E. RUBRA A. Adams. Pl. 67, fig. 79.

Shell conical, umbilicate, solid, bright rose color, spire elevated, acute; whorls 5–6, convex, rounded, encircled by alternately larger and smaller closely beaded riblets, numbering 9 on the penultimate, 4 on the next earlier whorl, about 14 on the last whorl, of equal size on its latter portion. Sutures narrowly canaliculate; body-whorl rounded; aperture rounded, finely sulcate inside; columella straight, toothed at base, with a narrow square notch between the tooth and the tubercles of the basal lip. Alt. 8, diam. 7 mill.

China.

Monodonta rubra A. ADAMS, P. Z. S. 1851, p. 176.

A lovely little thing, deep rose or carmine in color, more conical than *E. atratus*, with a tubercle below the columellar tooth, and a rather deep square notch between them. Umbilicus as in *atratus*.

E. INSTRICTUS Gould. Pl. 67, figs. 62, 63.

Shell small, elevated, ovate-conic, solid, white, with a series of about 10 rufous spots near the suture, whorls 5, forming a conical

spire, ventricose, with delicate, highly elevated spiral rib-striae, of which there are about 5 on the upper and 10 on the last whorl. The surface of the ribs is slightly tuberculous, and the last one overhangs the succeeding whorl so as to form a broad deep channel at the suture. The interspaces have about the same width as the ribs, and are beautifully barred with close-set laminae; base convex, with a small deep scalariform umbilicus, sculptured like the spire. Aperture obliquely semicircular; lip crenulated by the ribs, conspicuously sulcate within; columella sharp, oblique, armed with a fully-developed sharp tooth at base, succeeded by a deep basal notch. (*Gld.*) Alt. 9, diam. 7 mill.

Viti Is. ! New Caledonia ! Japan ?

Tr. (Monodonta) instrictus GOULD, Proc. Bost. Soc. N. H. iii, p. 167, 1849; U. S. Expl. Exped. Moll., p. 190, f. 225.—*Euchelus instrictus* GLD., Otia Conch., p. 245.—*Turcica instricta* GLD., A. Ad., Ann. and Mag. N. H. xiii, (3d. ser.) p. 143, 1864.—*Monodonta bourcierei* CROSSE, Journ. de Conchyl., 1863, p. 178, t. 4, f. 6.—*Tr. bourcierei* CROSSE, FISCHER, Coq. Viv., p. 249, t. 84, f. 3.

This little shell is conical, like *E. rubra*, whitish with a series of brown spots below the suture, often continued as stripes to the periphery. *Tr. bourcierei* Crosse (pl. 37, figs. 18, 19) is a synonym. Specimens of it from New Caledonia are before me. Of the typical form I have shells from the Viti Islands.

E. PERSICUS Von Martens. Pl. 39, figs. 31, 32.

Shell globose-conoidal, perforate, granulate-cingulate, cinguli unequal, with a few blackish spots, 8 conspicuous cinguli on penult., about 20 on last whorl; interstices narrow, pitted; suture profound; aperture ovate-circular, throat sulcate, corresponding to the external sculpture, margin bright silvery, denticulated by the terminating cinguli; columella arcuate, white, terminating in a more or less obsolete denticle; umbilical fossa between the columellar margin and the lowest cingulus shining, white.

Alt. 17, diam. maj. 16, min. 14 mill.; aperture, long. $11\frac{1}{2}$, lat. $8\frac{1}{2}$ mill. (*Mart.*)

Nearest allied to *E. atratus* Gmel., *pullatus* Ant., and *baccatus* Mke. Distinguished from the first by the reduced or absent columellar tooth and lighter color; from the last two by the numerous spirals and narrow pitted interstices. The count of spirals is not very constant, because there are frequently, especially on the last

whorl, intermediate smaller ones developed. The long groove between the columellar edge and the lowest spiral reminds one somewhat of *Lacuna*; it is not so deep as in *atratus*, and is porcelain-white, not silvery as that of *atratus* largely is. (*Mart.*)

E. GEMMATUS Gould. Pl. 11, figs. 54, 55.

Shell small, globose conic, solid, thick, pinkish, or ashen-pink, irregularly dotted or longitudinally striped with dull red; spire short, acutely conic; sutures narrowly canaliculate; whorls 5, convex, encircled by numerous closely finely granose riblets, usually 12-14 in number on the body-whorl, the interstices with oblique raised striæ or not visibly sculptured. Body-whorl rounded, globose; mouth rounded, outer lip thick, lirate inside; columella short, straightened, obtusely subtuberculate in the middle, ending in a projecting tooth, between which and the basal margin there is a deep narrow notch; umbilicus narrow.

Alt. 6, diam. $5\frac{1}{2}$ mill.

Sandwich and Viti Is.; Upolu.

Trochus (Monodonta) gemmatus GOULD, Proc. Bost. Soc. Nat. Hist. ii, p. 27, 1845.—*Tr. gemmatus* Gld., FISCHER, Coq. Viv., p. 241, t. 82, f. 3.

The above description was drawn from a Sandwich Id. specimen. The ground-color varies from nearly white to ashen-pink. On the darker forms the dots are obscure, and they appear unicolored, of a dingy pinkish hue. There seems to be great variation in the number and development of the spiral grained riblets. The ribs sometimes alternate in size on the median part of the last whorl, three being slightly larger. Most of the specimens I have seen are decidedly smaller than the measurements given above, averaging alt. $4\frac{1}{2}$ -5, diam. 4 mill.

E. LACTEUS Philippi. Pl. 57, figs. 37, 38.

Shell small, subglobose, umbilicate, milk white; whorls convex, the upper ones showing 3 series of nodules, the last 9-10 series; suture profound; umbilicus margin entire; columella scarcely solute above, with a denticle at base. (*Phil.*) Alt. $2\frac{1}{2}$, diam. 3 mill.

Friendly Islands.

Monodonta lactea PHIL., Archiv. f. Naturg. 1845, i, p. 66.—*Trochus lacteus* PHIL., Conchylien Cab., p. 83, t. 14, f. 16.

Said by Philippi to be full grown, but probably not so.

E. FISCHERI Montrouzier. Pl. 38, figs. 18, 19.

Shell small, umbilicated, globose-conoid, white, sparsely spotted with chestnut; whorls 5, subconvex, ornamented with subcontiguous, granose, spiral ribs; two supra-sutural ribs small and almost concealed by the following one, which is the strongest of all. The ribs are alternately elevated; last whorl rounded, equaling $\frac{1}{2}$ the length; base perforated; aperture oblique, rounded, inside pearly, shining; lip thickened, acute at edge, crenulate, thickened inside, deeply sulcate; columella with 2 little tubercles, the upper small, the other terminal, strong, transversely entering.

Alt. 4, diam. 4 mill. (*Souverbie*.)

Id. of Art, New Caledonia.

Monodonta fischeri MONTOUZIER, Journ. de Conchyl. 1866, p. 142, t. 6, f. 7.—*Tr. fischeri* Montr., SOUVERBIE in FISCHER, Coq. Viv., p. 246, t. 84, f. 1.

E. GUTTAROSEA Dall. Pl. 51, fig. 21.

Shell small, white, the upper surface of the whorls with very small distinct rose-red dots sparsely distributed on the raised nodules of the sculpture, or all white; five or more inflated strongly sculptured whorls, and a smooth nucleus. Spiral sculpture of, on the upper surface of the last whorl, two small and two strong spiral alternated ribs, one of the smaller just below the suture; a large spiral on the periphery and four on the base; crossed by numerous obliquely radiating threads, which make the early whorls coarsely reticulate with nodules at the intersections, while in the later whorls the radiations become less marked and the spirals more numerous and more conspicuously nodulous. Whorls rounded, apex a little blunt, suture distinct, not channelled, base rounded, umbilicus none; pillar nearly straight, with a strong tooth near its base, aperture rounded, oblique, a little descending above, with six or eight stout liræ ending in tooth-like nodules, body with a moderate layer of nacreous callus. Alt. 5.0, diam. 4.5 mill. (*Dall.*)

Off Havana, in 119–450 fms.; West Indies generally.

Euchelus guttarosea DALL, Blake Report Gasterop., p. 382, t. 33, f. 7.

Section HYBOCHELUS Pilsbry.

Species of this Section have a great resemblance to certain forms of *Stomatella*. I believe them nevertheless to belong to *Euchelus*.

E. CANCELLATUS Krauss. Pl. 57, figs. 1, 2, 3.

Shell depressed, umbilicate, helicoid or almost *stomatia*-shaped, the last whorl and aperture very large, reddish-brown, marked with white on the spiral ribs; spire very short, small; whorls nearly 4, convex, the inner $1\frac{1}{2}$ smooth, the rest with strong, separated spiral liræ, the interstices wider than the liræ, rendered pitted by raised, regular rib-striae each interliræ interval with a central spiral thread. There are 3 principal liræ on the penultimate whorl, the outer lip inserted on the fourth; on the base there are 8 concentric liræ, alternately larger and smaller, the inner one bounding the umbilicus and spirally entering it. Aperture large, oblique, finely sulcate, pearly and iridescent inside; lip thin; columella arcuate, not toothed, a trifle reflexed above, connected with the upper lip by a short, shining, white callus. Umbilicus narrow, funnel-shaped.

Alt. 10, diam. 13 mill.

Cape of Good Hope.

Stomatella? cancellata KRAUSS, Die Südaf. Moll., p. 93, t. 5, f. 26, 1848.

The edentulous aperture, large body-whorl, small, low spire and latticed sculpture separate this from all species except those immediately following. The shell is very aberrant for an *Euchelus*.

E. FOSSULATUS Souverbie. Pl. 38, figs. 15, 16.

Shell umbilicate, heliceiform, whitish, spotted with pale reddish; whorls 5, convex, separated by canaliculate sutures, all over regularly clathrate, penultimate whorl with 4 spiral cinguli, a minute riblet interposed in each interval; the pits between the longitudinal and spiral riblets oblong, quadrilateral; last whorl convex beneath, with close radiating lamellæ; aperture ovate, sulcate inside; lip thin, plicate; columella arcuate, edentulous, a little reflexed above; umbilical tract white, striate; umbilicus profound.

Alt. $12\frac{1}{2}$ diam. 15 mill.; alt. 9, diam. 10 mill. (*Fischer.*)

Andaman Is. (Nevill); New Caledonian Archipelago (Montr.).

Tr. (Euchelus fossulatus SOUV., Journ. de Conchyl. 1875, p. 39, t. 4, f. 5.—FISCHER, *ibid.*, p. 50; Coq. Viv., p. 391, t. 117, f. 2.

Very similar to *E. cancellatus* Krauss, but with slightly more prominent spire.

E. MYSTICUS Pilsbry. Pl. 57, fig. 7.

Shell globose-depressed, yellowish-white, with purple-brown dots on the spiral ribs, spire very short, conic; imperforate; whorls $4\frac{1}{2}$ or

5, very rapidly increasing, the nuclear one smooth, the remainder clathrate with strong spiral ribs crossed by elevated, close, vertical striæ, which crenulate the ribs and cut the interstices into pits. There are 3 stronger spirals on the penultimate whorl, with a riblet in each interval; on the earlier whorls there are only 3 spirals; the last whorl at its termination has about 27 spirals; the base has about 8, alternating in size; there is a strong spiral bordering the closed umbilicus; aperture large, expanded, slightly sulcate inside, quite oblique; columella simple, concave flattened, and above reflexed, connected with the upper margin of peristome by a short shining parietal callus. Alt. 8, diam. 9 mill.

Singapore (Archer).

“*E. edentulus* Recl.” in Phil. Acad. Coll., not *E. edentulus* A. Adams, P. Z. S. 1851.

A form allied to *E. fossulatus* and *cancellatus*, but with closed umbilicus, reflexed columellar edge, and differing in some details of sculpture. I cannot learn that Recluz ever described this shell, but the specimens before me bear his name.

E. DELPRETEI Caramagna. Pl. 51, figs. 8, 9.

Shell conic-depressed, umbilicate, rather thick, whitish, subvitreous; apex obtuse; first 3 whorls planate above, elegantly ornamented with elevated spiral ribs and longitudinal striæ; first whorl nearly smooth; the last double as long as the spire, tumid, dilated, ornamented with 3 elevated cinguli on the lower part, 2 less elevated ones above; base with 6 granulose, minutely striated, concentric cinguli; lip thin, denticulated by the external sulci; columella smooth, straight, excavated at base, scarcely forming a denticle; aperture white, oblique, sulcate within.

Alt. 4, diam. 4 mill. (*Caramag.*)

Assab, West Shore of the Red Sea.

E. Del Pretei CARAMAGNA, Bull. Soc. Mal. Ital. xiii, p. 131, t. 8, f. 9, 1888.

Section HERPETOPOMA Pilsbry.

E. SCABRIUSCULUS Adams and Angas. Pl. 38, fig. 12.

Shell small, very minutely perforate, thick, conoidal, ashen-reddish; whorls 5, separated by canaliculate sutures, convex, the embryonic ones smooth, the rest roughened, spirally cingulate, cinguli 4 on the penultimate whorl, unequal, the upper two smaller,

the third forming a carina; sometimes with a delicate riblet between the 3d and 4th liræ; last whorl subrotund, with unequal, alternating cinguli; base convex, with 5-6 concentric beaded cinguli; interstices clathrate; aperture subovate, sulcate inside; lip thick, duplicate; basal margin plicate-dentate, and deeply notched; columellar callous a little reflexed above, passing into the right margin.

Alt. 4, diam. 4 mill. (*Fischer.*)

Port Jackson; New South Wales, Australia.

Euchelus scabriusculus A. AD. and ANG., (MS. in Coll. Cum.) P. Z. S. 1867, p. 215 (no description).—*Trochus scabriusculus* Adams, FISCHER, Coq. Viv., p. 374, t. 114, f. 2.

Operculum *multispiral*, as in most genera of Trochidæ not few-whorled as is the case with *Euchelus*.

Subgenus TALLORBIS G. and H. Nevill.

Tallorbis NEVILL, Journ. Asiat. Soc. Bengal xxxviii, p. 159, pt. i, 1869.

I am in doubt about the systematic position of this group. Nevills compare it to *Thalotia*. Fischer considers it a section under *Euchelus*. The original description is as follows: Shell suborbiculate, subconic; columella solid, anteriorly applanate, transversely plicate and abruptly terminated.

E. ROSEOLA Nevill. Pl. 57, fig. 15.

Shell depressed-conical; whorls 5, rapidly widening, separated by profound sutures, spirally distanty costulate, costulae 3 on penultimate whorl, separated, elegantly ornamented with numerous rosy tubercles, the interstices wide, divided by a central spiral thread, transversely cancellated; base convex, similarly ornamented; aperture ample, subrotund, pearly, smooth inside in adult specimens, in young ones sulcate; lip scarcely thickened, crenulate at the margin; labium thin; columella thickened anteriorly, subreflexed, with three twisted plicæ. Alt. 11½, diam. 11 mill. (*Nevill.*)

Southern Province of Ceylon.

Tallorbis roseola G. and H. NEVILL, Journ. Asiat. Soc. Bengal, xxxviii, pt. i, p. 160, t. 17, f. 5, 1865.

The following species of A. Adams' may be regarded as unidentifiable and practically non-existent.

MONODONTA SULCIFERA A. Adams. Testa globoso-conica, umbilicata, fusca, cingulis granorum distantium moniliformibus, inter-

stitiis profunde sulcatis, sulcis sublevis, longitudinaliter striatis ornata; columella ad basin trisulcata, dente parvo acuto instructa; labro tenui, intus sulcato. (*Ad.* in P. Z. S. 1851, p. 175.)

Roebuck Bay, N. Australia.

MONODONTA CLATHRATA A. Adams. Testa ovato-conoidea alba, imperforata, cingulis subgranosis distantibus ornata, in anfr. ult. 7, interstitiis costulis longitudinalibus eleganter clathratis; columella tuberculo parvo terminata; labro intus sulcato.

(*Ad.*, in P. Z. S. 1851, p. 175.)

Guidulman, Id. of Bohol, 60 fms.

MONODONTA TRICINGULATA A. Adams. Testa globoso-conoidea, umbilicata, rubente, albo et fusco variegata, cingulis parvulis granorum ornata; sutura canaliculata anfr. convexis, carinis tribus transversis prominentibus cinctis; umbilico profundo; columella ad basin tuberculo parvo terminata; labro expanso, tenui, intus levi.

(*Ad.*, P. Z. S. 1851, p. 175.)

Malacca; Singapore, 6 fms.

MONODONTA PHILIPPINA A. Adams. Testa globoso-conica, proforata, fusca nigro punctata; cingulis granulatis inaequalibus ornata; interstitiis clathratulis; umbilico parvo; columella tuberculo parvo terminata; labro intus sulcato. (*Ad.*, P. Z. S. 1851, p. 176.)

Puerte Galero, Mindoro, 9 fms.; Bolinao, Luzon, 10 fms.

MONODONTA EDENTULA A. Adams. Testa ovato-conoidea, umbilicata, fusca, costellis transversis imbricatis, interstitiis clathratis sculpta; anfr. valde rotundatis, umbilico infundibuliformi; columella subrecta, basi tuberculo terminata; labro margine crenulato.

(*Ad.*, P. Z. S. 1851, p. 176.)

Catbalonga, Id. of Samar, 6 fms.

MONODONTA STRANGEI A. Adams. Testa conoidea, perforata, fusca, cingulis granorum aequalibus confertis ornata; anfr. parum convexis, ultimo subangulato; columella curvata, dente obtuso terminata; labro intus sulcato, tuberculo prope basin columellae.

(*Ad.*, P. Z. S. 1851, p. 177.)

Sydney, under stones.

MONODONTA PUNCTIGERA A. Adams. Testa globoso-conoidea umbilicate, alba fusco punctata, cingulis granulosis inaequalibus rufo-

punctatis ornata; sutura canaliculata; anfractibus rotundatis; umbilico aperto, infundibuliformi; columella recta, brevi, basi bituberculata, dente parvo acuto terminata; labro expanso, intus sulcato.

(*Ad.*, P. Z. S. 1851, p. 177.)

Singapore, 6 fms.

MONODONTA EXASPERATA A. Adams. Testa globoso-conoidea, umbilicate, subdepressa, albida, nigro-variegata, cingulis spino-granulatis exasperata; columella sinuata, dente prominenti terminata; labro incrassato, duplicato, intus valde lirato.

(*Ad.*, P. Z. S. 1851, p. 177.)

Sibonga, *Id. of Zebu*, at low water; *Id. of Siquijor*, under stones.

EUCHELUS INDICUS A. Adams. Testa globoso-conica, imperforata, grisea, cingulis transversis inaequalibus, confertis, moniliformi ornata; anfr. rotundis; columella ad basin tuberculo acuto instructa; labro expanso, intus valde lirato.

This is a solid, imperforate gray-colored species, of the same dimensions and style of sculpture as *E. denigratus* Chemn., but quite distinct specifically. (*Adams*, in P. Z. S. 1854, p. 316.)

Bombay.

EUCHELUS MACULOSUS Pease. Shell small, umbilicate, somewhat conically-globose, rather thin, shining, concentrically irregularly ribbed, longitudinally very finely striated. Color white; transverse ribs spotted somewhat remotely with red.

Breadth 2, height $1\frac{1}{2}$ mill. (*W. H. Pease*, P. Z. S. 1862, p. 43.)

Pacific Is.

TROCHUS (EUCHELE) ALABASTRUM Reeve. Testa subdepresso-conoidea, anguste umbilicate; spira exserta; sutura peculiariter, profunde excavata; anfr. deinde concavis, et fortiter tricarinatis, carinis subirregulariter undatis et exquisite serratis; calcareo-alba, carinis punctis nigris subdistantibus peculiariter notatis. long. $\frac{5}{8}$, lat. $\frac{5}{8}$ poll. Of this very striking species there is a second specimen in the collection of Mr. Cuming. It is of a pure chalk-white substance, strongly spirally grooved and keeled throughout, the keels being sparsely dotted with black. (*Reeve*, P. Z. S. 1857, p. 209.)

Id. of Diego Garcia, near Mauritius.

Subgenus DANILIA Brusina.

Olivia CANTRAINE, Bull. de l'Acad. Roy. des Sci. et Belles-Lettres de Bruxelles ii, p. 387, 1835, Type, *O. otaviana* Cantr. (not *Olivia*

Bertholoni, 1810, a genus of Sponges).—*Craspedotus* PHILIPPI, Zeitschr. f. Malac. 1847, p. 28, Type, *C. limbatus* Phil. (not *Craspedotus* Schœnbeier, Gen. e Spec. Cure., suppl. 1844, a genus of Rhynchophora).—*Danilia* BRUSINA, Conch. Dalm. ined., p. 25, 1865.

D. *TINEI* Calcare. Pl. 37, figs. 20–22.

Shell imperforate, conoidal with rounded body-whorl and base, solid, light brown; spire elevated, whorls 6–7, convex, separated by deep sutures, the first planorboid, smooth, the next lightly rib-striate, the remainder clathrate, encircled by strong spiral liræ, crossed by elevated, lamellar, regular, vertical striæ; there are 3 or 4 spirals on the penultimate, 9 on the last whorl; body-whorl rounded, with a strong, prominent varix behind the outer lip; aperture rounded, thickened within and a little expanded, a trifle iridescent; columella short, vertical with a fold above at the insertion and a strong fold-like tooth below, separated from the plicate basal lip by a deep, narrow, notch. Alt. 9–10, diam. $6\frac{1}{2}$ –7 mill.

Mediterranean and Adriatic Seas, and Gulf of Gascogne, in deep water.

Monodonta tinei CALC., Rierche Malac., p. 14, f. 8, 1839.—*Tr. tinei* Calc., Petit, Cat. Test. Mar., p. 119, 1869.—FISCHER Coq. Viv., p. 141, t. 47, f. 3.—*Trochus tineis* Calc., FORBES, Æg. Invert., p. 138, 1843.—*Monodonta limbata* PHIL., Enum. Moll. Sicil. ii, p. 157, t. 25, f. 19, 1844.—*Tr. limbatus* PHIL., Conchyl. Cab., p. 240, t. 36, f. 10.—*Trochus bilabiatu*s Phil., Zeitschr. f. Mal. 1847, p. 23.—*Craspedotus otavianus* H. & A. AD., Genera, i, p. 417, t. 47, f. 4.—CHENU, Manuel i, p. 358, f. 2650 (not *Olivia otaviana* Cantraine, Bull. Soc. Roy. Bruxelles ii, p. 389, 1835, and Malac. Medit. t. 6, f. 13, a tertiary fossil species).—*Tr. horridus* O. G. COSTA, Microd. Medit., p. 56, t. 9, f. 6, 1861.—*Heliciella costellata* COSTA, loc. cit., p. 63, t. 10, f. 3.—*Craspedotus limbatus* Phil., RYCKHOLT, Journ. Conchyl. x, p. 413, 1862.—BRUSINA Contr. pella Fauna Dalm., p. 79, 1866.—WEINKAUFF, Conch. des Mittelm. ii, p. 348.—HIDALGO, Mol. Mar. Esp., t. 18, f. 6, 7.—*Danilia limbata* Phil., BRUSINA, Conch. Dalm. ined., p. 25, 1865.—*Danilia tinei* Calc., MONTEROSATO, Bull. Soc. Mal. Ital. vi, p. 252; Nom. Gen. e Spec., p. 48, 1844.—BUQUOY, DAUTZ. and DOLLÉ, Moll. du Rouss., p. 416, t. 50, f. 21–24, 1885.

This rare little shell cannot be confounded with any other species; the tortuous columella, latticed sculpture and strongly varixed outer lip form a combination unknown elsewhere in recent Trochidæ.

There is a large number of fossil (Cretaceous and Tertiary) species of *Danilia*; for these, see Ryckholt, Catalogue des espèces du genre *Craspedotus*, in Journ. de Conchyl. 1862, p. 413.

Genus UMBONIUM Link, 1807.

Umbonium LINK, Besch. Rostock Samml., p. 136.—A. ADAMS, Monograph in Proc. Zool. Soc. 1853, p. 187.—H. and A. AD., Genera Rec. Moll. i, p. 407.—*Globulus* SCHUMACHER, Essai d'un Nouv. Syst., 1817.—PHILIPPI, Monograph in Kuster's Conchylien Cabinet.—*Rotella* LAMARCK, Animaux sans Vertèbres vii, p. 6, 1822, and of most authors.—*Helicina* GRAY, Proc. Zool. Soc. Lond. 1847, p. 145, not of Lamarck.—*Pitonellus* and *Pitonillus* MONTFORT. Conch. Syst. ii, p. 170, 171.—*Ptychomphalus* AGASSIZ, in part, 1837,

A group of elegantly painted shells, the prominent characters of which are the depressed form, polished surface, thin internal nacreous layer, and very heavy pad of polished callus covering and filling the umbilicus. The operculum is horny, fragile, with very numerous narrow whorls. The species range from Japan to Singapore, Philippines, etc., westward to Ceylon. A single little species has been dredged by the U. S. steamer 'Blake' in the Gulf of Mexico.

Schema of oriental species.

- A. *Species with the upper surface smooth, not sulcate.*
 - a. *Conical above, base flat, conicum, thomasi, adamsi.*
 - aa. *Convex above and below, vestiarium, callosum, sagittatum,*
[*giganteum.*
- AA. *Upper surface spirally sulcate, costatum, superbum, suturale,*
[*moniliferum, japonicum.*

U. VESTIARIUM Linné. Pl. 58, figs. 1-8.

Shell depressed, thin but strong, shining, polished, smooth; spire low but conical; whorls about 6, flat, the last usually a little depressed below the linear sutures, rounded at periphery, a little convex beneath; callus pad large, convex, thick; aperture subtriangular, iridescent within. Alt. 10, diam. 15 mill.

Indian Ocean, Madras and Ceylon to Java, Philippines, Singapore, New Ireland.

Trochus vestiarius LINN., Syst. Nat. x, p. 758.—*Rotella lineolata* LAM., An. s. Vert., vii, p. 7.—KIENER, Spec. et Icon., Genre Roulette, p. 3, t. 1.—*Rotella elegans* BECK in KIENER, l. c., p. 4, t. 3,

f. 6.—SOWERBY, Thes. Conch. v, p. 135, t. 472, f. 6-8; in Conch. Icon. xx, f. 6.—*Rotella vestiaria* SOWB., Thes. Conch. v, p. 135, f. 1-5; in Conch. Icon. f. 12.—*Rotella rosea* LAM., l. c., No. 2.—*Globulus vestiarius* Linn., PHILIPPI, Conchyl. Cab., p. 45, t. 7, f. 1-10.—*G. elegans* Beck, PHIL., l. c., p. 46, t. 7, f. 16-20.—*Umbonium depressum* A. ADAMS, P. Z. S. 1853, p. 188.—*Rotella depressa* Ad., SOWERBY in Conch. Icon., f. 2.—*Globulus australis* PHILIPPI, Conchyl. Cab., p. 48, t. 7, f. 21-23.—*Globulus parvulus* Anton, PHILIPPI, Conchyl. Cab., p. 48, t. 7, f. 11, 12.

An excessively variable form. Sometimes the spire is scarcely more convex than the base, though always conical. Usually it is more elevated. *U. depressum* Ad. (pl. 58, figs. 24, 25) is a depressed form. The colors are indescribably variable, usually very vivid. The following are the more usual patterns:

(1) Uniform white, rose-color, fawn or flesh-color, or slaty-blackish. (2) Marked with close, zigzag radiating lines or stripes above, the base white or colored like the lines. (3) Radiately lineolate, the lines interrupted by spiral zones of rose or white. (4) Finely mottled above, with a peripheral zone of large spots, or a white-edged girdle of red.

There are any number of modifications and combinations of these patterns. I am unable to separate *U. elegans* from *U. vestiarium*, even varietally.

U. CALLOSUM Sowerby. Pl. 59, fig. 36.

Shell depressed, solid, outer lip thin; white or yellowish, finely marbled all over with black, gray or ashen, sometimes with a series of white blotches at the periphery; basal callus white, yellow, reddish or black. Surface polished, smooth; spire low, conical, acute; whorls 6-7, slightly convex, separated by simple, linear sutures; last whorl very rapidly widening, large, dilated, flat on the base, except for the large circular callus, which is excessively heavy and convex; aperture oval-truncate. Alt. 8, diam. 13 mill.

Indian Ocean.

Rotella callosa SOWERBY, Thes. Conch. v, p. 135, t. 472, f. 26 (1887, date of title-page).

The texture is like *U. vestiarium*; the last whorl is very wide, and the umbilical callus far heavier, more convex, than in any other known species; 6 specimens are before me, bearing the rather indefinite habitat given above.

U. SAGITTATUM Hinds. Pl. 59, fig. 47.

Shell smaller, more depressed than *U. vestiarius*, fawn or flesh-colored, with a row of arrow-shaped dark spots at the periphery, and another a short distance below the suture; whorls about $4\frac{1}{2}$, rapidly widening, the last depressed; spire lower than in *U. vestiarius*; basal callus convex, circular, smaller than in *vestiarius*. Surface perfectly smooth and polished. Alt. 4, diam. 6 mill.

Straits of Macassar.

Rotella sagittata HINDS, Zool. Voy of the Sulphur ii, p. 52, t. 16, f. 18, 19.—SOWERBY, Thes. Conch. v, p. 137, f. 9; in Conch. Icon. xx, f. 9.—*Globulus sagittatus* Hinds, PHIL. Conchyl. Cab., p. 49, t. 7, f. 13, 14 (copied from Hinds).—*Globulus articulatus* PHILIPPI, loc. cit., p. 49, t. 7, f. 24, 25.

Spire more depressed than *U. vestiarius*, and coloration so far as I know constantly as above described. The callus is smaller and rounder than in *vestiarius*, and either white or slaty colored.

U. CONICUM Adams et Reeve. Pl. 59, figs. 45, 46; pl. 58, fig. 15.

Shell conic with flat base, polished, smooth, thin but solid; dark purple, unicolored with reddish apex, or with an opaque white band on the lower part of each whorl, or with the entire upper surface of the two outer whorls white, the base purple; spire conical, lateral outlines straight; whorls 6, rather slowly widening, the last rounded at periphery, flat below, or a trifle concave around the rather small, circular, dark central callus; aperture subquadrate, iridescent inside; columella short, oblique, very thick and heavy, with a little nick in the edge near its base, and a slight notch where it is inserted upon the basal callus pad. Alt. 5, diam. 7 mill.

Mouth of Lundu River, Borneo; China seas.

Rotella conica AD. and REEVE, Zool. H. M. S. Samarang, Moll., p. 49, t. 11, f. 22, 1850.—SOWERBY, Thes. Conch. v, p. 136, f. 10; in Reeve, Conch. Icon., f. 1.

The coloration is peculiar; a beautiful iridescence glows through the purplish outer coat of the upper whorls. The conical form, flat base, and peculiarly *nicked* columella, together with the polished surface, smooth except for fine, impressed lines of increment, are diagnostic. *U. thomasi* Crosse, is larger and quite differently colored and sculptured.

U. THOMASI Crosse. Pl. 57, figs. 31, 32.

Shell conical, the base nearly flat; light fawn-color, whitish or yellowish, with close, numerous, narrow, radiating reddish or bluish-brown stripes above, often interrupted by an ill-defined light zone just below the periphery; sutures linear, narrowly margined with a reddish line, becoming blackish on the last whorl; base with a dark streak around the callus, and radiating lines or stripes colored like the upper surface. Surface apparently smooth and polished, but under a lens seen to be very densely, finely decussated all over by incised lines and oblique striæ of exquisite fineness. Whorls $6\frac{1}{2}$, plane, apex acute; base flat, central callus smaller than in *U. vestiarium*, nearly flat, roughened, thickest on the columellar lip; columella ending in a point below.

Alt. 9. diam. $12\frac{1}{2}$ mill. (specimen); alt. 9, diam. 18 mill. (Crosse.)

Hakodadi, Japan; Northern China.

Globulus thomasi CROSSE, Journ. de Conchyl. 1863, p. 384, t. 13, f. 8.—*Umbonium thomasi* CROSSE, DKK., Ind. Moll. Mar. Jap., p. 135. *Rotella infraplanata* SOWB., Thes. Conch. v, p. 136, f. 11–13; and in Conch. Icon. xx, f. 10.

May be known by the conical form, flat base, decussated sculpture and the color pattern. The specimens from which the above description is drawn are labeled *New Caledonia*; whether correctly or not I cannot say. Crosse describes a variety which is rosy-white; suture rose-colored; longitudinally painted with pale blackish, flexuous, oblique lines.

Sowerby's *Rotella infraplanata* (pl. 58, figs. 10, 11, 12) seems to have no differential characters.

U. ADAMSI Dunker. Pl. 58, figs. 26, 27, 28.

Shell depressed-conoid, shining, glabrous, whitish, closely painted with undulating blackish-brown lines; whorls plano-convex, the last obtuse; base nearly plane; callus thick, ashen-white. A shell allied to the preceding, but distinguished by being smaller, alt. 6, diam. 12 mill., closely lineolate with blackish-brown or purple; base a little more convex; under a lens finely transversely and longitudinally striate. (Dkr.)

Japan.

U. adamsi DKK., Ind. Moll. Mar. Jap., p. 135, t. 6, f. 3, 4, 5; Mal. Bl. xxiv, p. 74.

Seems to differ but slightly from the preceding.

U. GIGANTEUM Lesson. Pl. 58, figs. 17, 18, 19.

Shell large, depressed, solid; slate-colored or reddish above, with a series of black spots below the suture, sometimes alternating with white ones, the periphery usually encircled with a row of white blotches; base largely white, with a dark streak encircling the callus; spire low, conoidal; whorls 7, plane, the last often somewhat concave above, rounded at the circumference, slightly convex beneath; surface shining, smooth, with a few (usually 4) narrow spiral impressed lines just above the periphery, which are obsolete in the adult. Base convex, callus white, or partly brown or ashen; in the middle there is a prominent, blunt, heavy tubercle. Aperture oblique, subquadrate. Alt. 16, diam. 27 mill.

Japan.

Rotella gigantea LESSON, Illust. de Zool., t. 17, 1831.—KIENER, Spec. et Icon. Coq. Viv., p. 6, t. 3, f. 7.—SOWERBY, Thes. Conch. v, p. 136, f. 15, 16; and in Conch. Icon. xx, f. 3.—*Globulus giganteus* Less., PHILIPPI, Conchyl. Cab., p. 50, t. 8, f. 1.—*Rotella aucta* SOWERBY, Genera of Shells, f. 3.—REEVE, Conch. Syst., t. 216, f. 3.—*Umbonium giganteum* A. AD., P. Z. S. 1853, p. 188; Ann. & Mag. N. H. xi, p. 265, 1863.—DUNKER, Ind. Moll. Mar. Jap., p. 134, 1882.

The largest species of Umbonium. The nearly smooth surface blotched periphery and central tubercle on the callus pad distinguish it. Included in my grouping of species with *vestiarium* etc., but more allied to *costatum*.

U. COSTATUM Valenciennes. Pl. 59, figs. 34, 35.

Shell heavy, solid, depressed, spire low-conoidal, periphery rounded; color whitish or light yellow, closely tessellated all over with blackish-olive or reddish-brown squarish spots; surface shining, polished, with strong spiral grooves above, generally 4 to 6 on last whorl; sutures narrowly impressed, with a rather wide margin below them, which often shows a slight tendency to be tuberculate; base smooth, tessellated around the irregularly convex, flesh-colored central callus; whorls 6, the last a little concave above, convex beneath; aperture subquadrate, pearly inside; callus circular, heaviest in front of the aperture and behind the collumellar lip.

Alt. 11, diam. 17 mill.; alt. 20, diam. 26 mill.

Corea; Japan.

Rotella costata VAL., in KIENER, Spec. et Icon. Cov. Viv.; p. 10, t. 2, f. 5.—*Globulus costatus* Val., PHIL., Conchyl. Cab., p. 51, t. 7, f. 15.—*Umbonium costatum* Val., A. AD., P. Z. S. 1853, p. 188.—DUNKER, Ind. Moll. Mar. Jap., p. 134.

Sometimes nearly equal to *U. giganteum* in size, but usually not exceeding 18 mill. diam. The strongly costate upper surface will distinguish this shell from the preceding forms. The suture is not so deeply impressed, nor has it so prominent a margin as in *U. suturale*. The tessellated color-markings sometimes form subcontinuous oblique bands.

U. SUPERBUM Gould. Pl. 57, figs. 33–36.

Shell large, solid, depressed-conic, shining, brownish-green; whorls 7, the apical smooth, the following 4-sulcate, interspaces tessellated with whitish lines; base convex, whitish, ornamented with a green articulated zone; callus copious, full, reddish tinted; aperture rotund-ovate; columella thickened. Alt. 15, diam. 20 mill. (*Gld.*)

The five examples before me are smaller than *U. costatum* with the same number (7) of whorls; they measure 17–18 mill. diam., *costatum* being often larger; they have moreover a more acute apex, the first whorls are much steeper, more rectilinear in outline, and therefore the shell is higher and more conic; the suture is not so deep, the margin under it much weaker, sometimes scarcely visible, while that of *costatum* is often very strongly marked. The spiral furrows begin on the 3d whorl, sometimes at its termination, whilst in *U. costatum* they begin at the embryonic whorl. (*Lischke.*)

Nagasaki, Kagosima, Japan.

Rotella superba GOULD, Proc. Bost. Soc. N. H. viii, p. 17, 1861; Otia Conch., p. 156.—*Umbonium superbum* Gld., A. AD., Ann. Mag. N. H. xi, p. 265, 1863.—LISCHE, Jap. Meeres-Conchyl. ii, p. 83, t. 5, f. 18–21.—DUNKER, Ind. Moll. Mar. Jap., p. 134.

Evidently close to *U. costatum* Val. I have translated Gould's diagnosis, and the figures and part of the remarks of Lischke.

U. SUTURALE Lamarek. Pl. 58, figs. 13, 14.

Shell depressed, solid, strong, with low-conoidal spire, upper and lower surfaces nearly equally convex; color whitish or pinkish, with numerous, close, oblique, zigzag, radiating purplish-brown lines extending to the purple or crimson basal callus; surface polished, shining, with a few shallow spiral sulci on the upper surface,

generally not more than 4, frequently obsolete; whorls about 6, each with a prominent, convex margin bordering the deeply impressed suture, below this margin concave; last whorl rounded at the periphery, convex beneath; aperture subquadrate; basal callus irregularly convex, with two lumps or prominences, one back of the columellar lip. Alt. 12, diam. 19 mill.

East Indies.

Rotella suturalis LAM., An. s. Vert. vii, p. 80.—KIENER, Spec. et Icon. Coq. Viv., p. 8, t. 2, f. 3.—SOWERBY in Conch. Icon. xx, f. 7.

Has fewer spiral sulci than *U. costatum*, and more profoundly impressed suture, with raised margin.

U. MONILIFERUM Lamareck. Pl. 58, figs. 22, 23, 29, 30, 31.

Shell depressed, solid, with very low, conoidal spire; color yellow, pinkish or whitish, closely tessellated with purple-brown or bluish slate-color, the basal callus purplish flesh-colored; surface shining, polished, with spiral sulci above, generally 3-5 in number on the last whorl, often subobsolete; suture margined by a row of prominent tubercles, 8 to 11 on the last whorl; whorls about 6, the last rounded at the periphery, convex beneath; callus quite heavy, convex, circular. Alt. 8, diam. 13 mill.

Japan.

Rotella monilifera LAM., An. s. Vert. vii, p. 8.—REEVE, Conch. Syst. ii, t. 216.—KIENER, Spec. et Icon. Coq. Viv., p. 9, t. 2, f. 4.—SOWERBY, in Conch. Icon. xx, f. 5.—*Rotella javanica* LAM., teste KIENER, l. c.—DELESSERT, Rec. de Coq., t. 34, f. 4.—SOWERBY, Thes. Conch. v, p. 139, f. 23; in Conch. Icon., f. 8.—*Globulus moniliferus* Lam., PHIL., Conchyl. Cab., p. 52, t. 8, f. 6, 7, 8.—*Umbonium moniliferum* Lam. A. AD., P. Z. S. 1853, p. 188.—DKR., Ind. Moll. Mar. Jap., p. 135.—*Umbonium javanicum* Lam. AD., P. Z. S. 1853, p. 188.

This species has affinities with *U. costatum*. It is readily recognized by the row of subsutural beads or tubercles. One of the shells before me is very light colored, the tessellations of a light fawn tint.

U. JAPONICUM Sullioti.

Shell rather solid, diaphanous, lucid, conoidal more or less elevated; whorls 5, plane, separated by a little deepened suture; suture of the last whorl ornamented by a granulose cingulus; first whorl smooth, the remaining minutely cingulate, ornamented with close, oblique, sinuous striae; last whorl subangulated; striae more conspic-

nous at the aperture; base glabrous; umbilical area covered by a strong calcareous callus, covering nearly two-thirds of the base; apex frequently eroded, pearly; aperture oblique, ovate-rotund; columella thickened; lip simple, very acute, fragile. Color grayish-blue, with series of brown dots; columella white; callus flesh-colored.

Alt. 10-13, diam. maj. 14, min. $12\frac{1}{2}$ mill.

Sea of Japan.

Rotella japonica SULLIOTTI, Bull. Soc. Mal. Ital. xiv, p. 70, 1889.

Unfigured and insufficiently characterized. Sullioti does not compare with the already known Japanese *Umbonium* with sculptured whorls and beaded suture.

U. BAIRDII Dall. Pl. 60, figs. 5, 6.

Shell small, depressed, conic, white, polished, externally porcellaneous, internally slightly nacreous; nucleus globular, dextral; whorls 5 or more; radiating sculpture of occasional faint impressed incremental lines; spiral sculpture of occasional microscopic striae, and a single strap-like band appressed to the suture, and bearing numerous flattish squarish nodules or elevations, which coronate the whorls; periphery rounded, base rounded, depressed in the center, which is nearly filled with a mass of white callus having a very finely granular surface. Aperture ovate, margin simple, thin, oblique. Alt. of axis $3\frac{1}{2}$, of shell 4, diam. 5 mill. (*Dall.*)

Florida reefs, 200 fms.; *Yucatan Strait*, 640 fms.

U. bairdii DALL, 'Blake' Gasterop., p. 359, t. 21, f. 6, 1889.

The specimen is not quite adult.

Genus ETHALIA Adams.

Ethalia A. ADAMS, Proc. Zool. Soc. Lond. 1853, p. 189. Type, *Umbonium guamense* Q. & G. (*Rotella*).—H. & A. AD., Genera Rec. Moll., p. 409.—FISCHER, Manuel, p. 822.—*Liotrochus* FISCHER, Journ. de Conchyl. 1878, p. 207.

I have here used *Ethalia* in its original sense, for the species grouping immediately around *E. guamense* Quoy. I am convinced that to these it should be restricted. The species are moderate-sized shells, somewhat between *Umbonium* and *Chrysostoma* in texture, depressed, the whorls convex, with a mottled or streaked color-pattern. The callus emitted at the columellar-parietal angle of the aperture is tongue-shaped, closing the umbilicus except a rather

narrow chink, or even entirely, in some species. (See pl. 57, figs. 41, 42, *E. guamense*, the type species.)

P. P. Carpenter, A. Adams (since 1860), Dr. W. H. Dall and other recent authors have adopted *Ethalia* for a group of minute, glassy or porcelaneous white shells, allied to *Teinostoma*, *Leucorhynchia*, *Pseudorotella*, etc. These, I contend, are entirely distinct from the type species of *Ethalia* and should be included under *Teinostoma* or some of its sections. No great violence would result from enlarging Fischer's PSEUDOROTELLA to cover the West American and Gulf species referred by authors to *Ethalia*. In fact, after a comparison of specimens, I am unable to see any character of importance separating them, part of the so-called 'Ethalia' being imperforate. I have appended a list of species referred erroneously to *Ethalia*, and have figured part of them. For further information see Mr. Tryon's monograph of *Teinostoma*, etc., MANUAL, vol. X, p. 103.

E. GUAMENSE Quoy et Gaimard. Pl. 59, figs. 38, 39. Pl. 57, figs. 41, 42.

Shell depressed, perforate, solid, strong, smooth, polished, whitish, mottled and lineolate above with brown, reddish, fawn-color or purplish, with 4 narrow spiral articulated lines, sometimes scarcely visible because of the variegated coloration; base lighter; whorls 6, convex, the last rounded, convex beneath; suture impressed; aperture oblique, outer wall moderately thick, columella strong and thick, arcuate above, spread upon the body-whorl and nearly over the umbilicus in a pad of callus, which is either white, pink or deep crimson; callus kidney-shaped, but slightly convex, filling the umbilicus except a narrow chink; from the outer termination of the callus an arcuate groove extends to the base of the columella, within which the surface of the shell is radiately finely striate and darker colored. Alt. 13, diam. 18 mill.

Guam; Luzon, Philippines (Sowb.).

Rotella guamensis Q. & G., Voy. de l'Astrolabe, Zool. iii, p. 267, t. 61, f. 32, 33, 1834.—KIENER, Spec. et Icon. Coq. Viv., p. 7, t. 2, f. 2.—SOWERBY, Thes. Conch. v, p. 137, f. 28, 29; in Conch. Icon., f. 18.—*Umbonium (Ethalia) guamense* A. AD. P. Z. S. 1853, p. 189.—*Trochus callosus*, KOCH, in PHILIPPI, Abbild. i, Trochus, t. 4, f. 2, p. 138, June, 1844.—Conchylien Cab., p. 233, t. 35, f. 7.—FISCHER, Journ. de Conchyl. 1878, p. 207; Coq. Viv., p. 378, t. 115, f. 3.—*Rotella montrouzieri* SOUVERBIE, Journ. de Conchyl. 1860, p. 123, t.

2, f. 11. (Not *Tr. callosus* Gmel., nor *Tr. callosus* Wood, nor *Rotella callosa* Sowerby.)

May be known, when typical, by the mottled coloration, with narrow spiral articulated lines above, the crimson callus almost closing the umbilicus, the globose-depressed form, etc. It seems to have real affinity with *Chrysostoma nicobaricum* and also with *Umbonium*. Specimens in which the umbilical callus is not fully developed are very similar to *Monilea*. This species is the type of *Ethalia* A. Ad., and *Liotrochus* Fischer.

Var. MONTROUZIERI Souverbie. Pl. 59, fig. 37 (enlarged).

Very minutely spirally striate above, whitish or ashen, marbled and lineated with greenish, reddish or flesh-colored; umbilical callus frequently completely closing the perforation, white.

E. ZELANDICA Hombron et Jacquinot. Pl. 58, figs. 9, 32, 33; pl. 59, fig. 66.

Shell depressed, imperforate, solid, yellowish or pinkish, radiately streaked with chestnut brown or red above, base with a reddish or purple zone around the central callus, the outer part white, more or less striped radiately; surface smooth, shining, base showing under a lens very fine, close, regular spiral striae; spire low, conoidal, sutures linear, not impressed; last whorl concave above, the compressed periphery encircled by two rather obscure carinae; base slightly convex, with a narrow spiral groove bounding a central area which is covered by a thin, radiately rugose, purple and white callus; aperture rounded quadrate, nacreous and iridescent within; columella short, very thick and heavy, its edge pearly, inserted in a pad of white callus on the body and over the axis.

Alt. 11, diam. 19 mill.

Auckland to Dunedin, New Zealand.

Rotella zelandica Hombr. & Jacq., Voy. au Pole Sud, Moll., p. 53, t. 14, f. 5, 6, 1854.—*Umbonium zelandicum* A. ADAMS, P. Z. S. 1853, p. 189.—*Rotella zelandica* Ad., SOWERBY, Conch. Icon. xx, f. 11; Thes. Conch. v, 136, f. 24.—*Globulus anguliferus* PHILIPPI, Conchylien Cab., p. 51, t. 8, f. 3 (1853?).—*Rotella neozelanica* HUTTON, Proc. Linn. Soc. N. S. Wales ix, p. 357, 1884.—*Umbonium chalconotum* A. AD., P. Z. S. 1853, p. 188.

Although this shell is imperforate, I do not hesitate to place it in the same genus with the *Rotella guamensis*. It does not belong in *Rotella* (*Umbonium*) proper. The callus emitted by the columellar

lip scarcely covers the axis, leaving often a slight pit. Well-preserved specimens show red and emerald-green reflections through the thin layer overlying the naere, like fiery opals. The radiating stripes, compressed last whorl, and biangular periphery easily distinguished this shell. Four names were proposed for this shell and published at about the same time—in 1854. I have no means of knowing which has priority, but am inclined to prefer Hombron's to Adams', as it was accompanied by good figures. The title page of Philippi's monograph is 1853, but the actual date of issue is very uncertain.

E. STRIOLATA A. Adams. Pl. 58, fig. 21.

Shell discoidal, subglobulose, subperforate, transversely striate; whorls 5, slightly convex; ornamented with very narrow transverse, white articulated, lines; base smooth, reddish-brown maculated at periphery, with a reddish zone around the umbilical region; callus white, small, partly concealing the umbilicus; aperture oval. (*Ad.*)
Borneo.

Umbonium (Ethalia) striolatum A. AD., P. Z. S. 1853, p. 189.—*Rotella striolata* AD., SOWB., Conch. Icon. xx, f. 13; Thes. Conch. v, p. 137, f. 18.—*R. trilobata* SOWERBY, Conch. Icon., f. 20; Thes. Conch., f. 14.

Var. *TRILOBATA* Sowb. Pl. 58, fig. 20.

Shell pale olive-gray, subdepressed, variously painted with spots and stripes; whorls rather convex above; umbilicus funnel-shaped; callus small, divided into three semicircular parts. Resembles *E. striolata* in form of callus, but is more pronounced. In rotundity of whorls the species is midway between the latter and *E. guamense*. (*Sowb.*)

E. PULCHELLA A. Adams. Pl. 59, figs. 59–63.

Shell sublenticular, obtusely angulated, umbilicate, smooth, shining, grayish-straw colored, above with little pale greenish-brown angular lines often confluent into wider streaks, below painted with white spots; spire a little prominent, apex a little acute, whitish; base around the umbilicus rather broadly, perspectively, radiately corrugated and angulate; aperture subrhomboidal, very oblique, throat pearly; peristome straight, obtuse, whitish, basal margin

arcuate, columellar margin expanded in a rosy, tongue-shaped callus, partly covering the umbilicus.

Diam. 7, alt. 4 mill.; aperture, diam. 3, alt. 2 mill. (*Martens.*)

Owen Id., Mergui Archipelago; Mindoro, Philippines.

Isanda pulchella AD., P. Z. S. 1853, p. 190.—VON MARTENS, Shells of Mergui, etc., Journ. Linn. Soc. Lond. xxi, p. 197, 1887, t. 16, f. 3.

Has much more the aspect of *Ethalia* than *Isanda*. The umbilicus is quite broad, and in the adult about half covered by the expanded columella.

Species allied to Teinostoma, erroneously referred to Ethalia.

ETHALIA LIRATA E. A. Smith (pl. 59, fig. 40). P. Z. S. 1871, p. 737, t. 75, f. 23.

Whydah, W. Africa.

ETHALIA PLICATA E. A. Smith (pl. 59, fig. 41). P. Z. S. 1871, p. 737, t. 75, f. 24.

Whydah, W. Africa.

ETHALIA CANDIDA A. Adams (pl. 59, fig. 42). Ann. Mag. N. H. 1862, p. 296.—Conch. Icon., f. 14.

Gotto Is., Japan, 71 fms.

ETHALIA POLITA A. Adams (pl. 59, fig. 55). Ann. Mag. N. H. 1862, p. 296.—Conch. Icon., f. 17.

Gotto Is., Japan, 71 fms.

ETHALIA OMPHALOTROPIS A. Adams. Ann. Mag. N. H. xi, p. 266, 1863.

Yobuko, Japan, 17 fms.

ETHALIA NITIDA A. Adams. Ann. Mag. 1865, p. 266.

Yobuko, Japan, 14 fms.

ETHALIA ATOMARIA A. Adams. Ann. Mag. N. H. 1861, viii, p. 305.

Kala-hai; Shan-tung, China.

ETHALIA PERSPICUA A. Adams (pl. 58, fig. 16). Ann. Mag. N. H. 1861, viii, p. 306.—Conch. Icon., f. 15.—Thes. Conch., f. 17.

Kala-hai; Shan-tung, China.

ETHALIA SOBRINA A. Adams (pl. 59, figs. 43, 44). Ann. Mag. 1861, viii, p. 306; xi, p. 266.—Conch. Icon., f. 19.

Kino-O-Sina; Takano-Sima, Japan, 25 fms.

ETHALIA BRAZIERI Angas (pl. 59, figs. 53, 54, enlarged). P. Z. S. 1877, p. 39, t. 5, f. 17.—*Rotella brazieri* Angus, Sowb. in Conch. Icon. xx, f. 16.

Sow and Pigs Reef, Port Jackson, Australia.

ETHALIA TASMANICA Tenison-Woods. Proc. and Rep. Roy. Soc. Tasmania 1876, p. 146 (1877).

Tasmania?

ETHALIA (?) CANCELLATA Tate (pl. 57, figs. 28–30). Trans. and Proc. and Rep. Phil. Soc. Adelaide, S. Australia, for 1878–79, p. 139, t. 5, f. 11. “A lenticular hyaline *Rotella*, with a cancellated sculpture.” Diam. .085 inch.

Holdfast Bay, St. Vincent's Gulf; Streaky and Fowlers Bays, Great Australian Bight.

ETHALIA PYRICALLOSA Carpenter, Cat. Mazatlan shells, p. 251, 1857.

Mazatlan.

ETHALIA LIRULATA Carp., *l. c.*, p. 251.

Mazatlan.

ETHALIA PALLIDULA Carp., *l. c.*, p. 252.

Mazatlan.

ETHALIA CARINATA Carp., *l. c.*, p. 252.

Mazatlan.

ETHALIA AMPECTANS Carp., *l. c.*, p. 253.

Mazatlan.

? GLOBULUS TUMENS Carp., *l. c.*, p. 250.

Mazatlan.

ETHALIA SUPRAVALLATA Carp., Proc. Cal. Acad. Sci. iii, p. 215, 1866.

San Diego, Cal.

ETHALIA VAR. INVALLATA Carp., *l. c.*, p. 215.

San Diego, Cal.

ETHALIA RECLUSA Dall, ‘Blake’ Gasterop., p. 361, t. 28, f. 7, 8, 1889.

Yucatan Strait, 640 fms.; Off N. Carolina, 12–63 fms.

ETHALIA SUPPRESSA Dall, Ibid., p. 362.

West Florida.

ETHALIA SOLIDA Dall, Ibid., p. 362, t. 28, f. 3, 5.

Off Bañia Honda, Cuba, 310 fms.

DILLWYNELLA MODESTA Dall. (Pl. 48, figs. 8, 9.) Ibid., p. 562, t. 21, f. 3.

Off Santa Lucia, 226 fms.

ROTELLA CRYPTOSPIRA Verrill, Trans. Conn. Acad. vi, p. 241, 1884.

Off Cape Hatteras, 142 fms.

ETHALIA MULTISTRIATA Verrill, Trans. Conn. Acad. vi, p. 242.

Off Cape Hatteras, 142 fms.

ROTELLA SEMISTRIATA Orbigny, Moll. Cuba, atlas, t. 18, f. 20-22. (*Pseudorotella*.)

ETHALIA RUFULA Gould, Proc. Bost. Soc. N. H. viii, p. 17, 1861.
Oosima, Japan.

ETHALIA CAPILLATA Gould, *l. c.*, p. 17.

Coast of China, 23° 30' N. lat., in 25 fms.

These two unfigured species may belong to true *Ethalia*.

Genus ISANDA H. & A. Adams.

Isanda AD., P. Z. S. 1853, p. 189; Genera Rec. Moll. i, p. 409.

A group of small, compact, polished, porcelaneous little shells with crenate-margined umbilicus, not covered by any reflection or callus of the columellar lip. The operculum is corneous, multi-spiral. The interior has a very thin nacreous layer. I unite *Umbonella* as subgenus or section.

I. CORONATA A. Adams. Pl. 59, figs. 56, 57, 58; pl. 57, fig. 12.

Shell small, umbilicated, depressed-turbinate, solid, polished, pinkish-white, with oblique, undulating grayish-pink longitudinal stripes; spire low, conic; apex acute; sutures deeply channelled, bordered by a corona of tubercles or beads; whorls 5, the last large, rounded or subangular at the circumference, convex beneath; aperture higher than wide, slightly oblique, quadrangular; umbilicus very deep, rather cylindrical, bordered by a deeply crenated white marginal rib, with a narrower beaded cingulus just outside of it. Alt. $3\frac{1}{2}$, diam. 4 mill.; diam. of umbilicus 1 mill.

Port Curtis and Torres Sts., N. Australia; S. Australia.

Isanda coronata AD., P. Z. S. 1853, p. 189; *l. c.* 1854, t. 27, f. 5; Genera, t. 46, f. 2.—CHENU, Manuel, fig. 2616.—*Trochus (Isanda) coronata* Ad., E. A. SMITH, Zool. Coll. H. M. S. Alert, p. 71, t. 5, f. p.—*I. lepida* A. AD., P. Z. S. 1853, p. 190.

A compact, depressed little shell, with diamond-shaped aperture, showing in fresh specimens a slight trace of pearl within. Adams describes the color as spotted with brown in transverse series, with transverse whitish lines, and a wide subsutural white band. The coloration is very inconstant, as the figures on pl. 59 (copied from Smith) show. The columella is straight, a trifle expanded above, connected with the upper lip by a thin parietal callus.

Var. *LEPIDA* A. Ad. Turbinate-conic, whitish-ashen, last whorl slightly angulated at periphery.

I. *SULCIFERA* A. Adams.

Shell orbicular-conoid, umbilicate, shining; spire a little elevated; whorls 5, subplanulate angular above, and with a deep sulcus there, above at the sutures crenulated and angulated, the last transversely sulcate, encircled by a hair-like carina at the periphery; whitish, ornamented with close longitudinal undulating and angular lines; umbilicus open, perspective, sulcate within, the margin crenated; aperture subquadrate; columella sub-straight, crenulated. (*Ad.*)

Philippines.

I. sulcifera AD., P. Z. S. 1853, p. 190.

In this species there is a conspicuous deep groove round the upper part of the whorls near the suture. (*Ad.*)

[*Isander crenelliferus* Ad., Ann and Mag. ix, 1862, p. 296, is the type of *Microthecca* Ad. See MANUAL, vol. X, p. 166.]

Subgenus *UMBONELLA* A. Adams.

Umbonella AD., Ann. Mag. N. H. 1863 (vol. xi, 3d ser.).

I. *MURREA* Reeve. Vol. X, pl. 58, fig. 62.

This shell was described and figured in the MANUAL, vol. X, p. 264. It is a small turbinate, porcelaneous shell, with narrow umbilicus, its margin crenated.

Gotto Is., Japan, 71 fms.

Turbo murreus REEVE, Conch. Icon., sp. 54, 1848.—*Isander maculosus* A. AD., Ann. Mag. N. H. 1862, xi, p. 296.—*Umbonella murrea* Reeve, AD., Ann. Mag. N. H. 1863, xi, p. 265.

Genus *CAMITIA* Gray.

Camitia GRAY, Syn. Moll. Brit. Mus. 1840.—H. & A. AD., Genera Rec. Moll. i, p. 409.

The systematic position of this group is not known to me. Fischer places it under *Clanculus* as a subgenus.

C. ROTELLINA Gould. Pl. 63, figs. 18, 19.

Shell covered-perforate, discoidal, depressed, smooth, shining; whorls 6, under a lens very minutely, obliquely striate; the earliest whitish, spirally obsoletely sulcate, the remainder pale flesh-colored, ornamented with a subsutural linear zone and oblique brown spots; last whorl dilated, obtuse in the middle, spirally trilineate (one line above, two at periphery), somewhat convex beneath, with two zones of brown spots; aperture transverse, scarcely sulcate within; columella nearly horizontal, twisted above, truncate beneath, columellar callus forming a coating to the extremely oblique umbilicus.

Alt. 6, diam. 11 mill. (*Fischer*.)

Chinese and Japanese Seas.

? *Tr. formosus* WOOD, Index Test., Suppl., t. 5, f. 29.—And FISCHER, Sp. et Icon., on plate 120, f. 4.—*Trochus (Monodonta) rotellinus* GOULD, Proc. Bost. Soc. N. H. iii, p. 108, 1850; U. S. Expl. Exped., p. 191, f. 222.—*Camitia pulcherrima*, ADAMS, Genera, t. 46, f. 3.—CHENU, Manuel, p. 354, f. 2617 (not *Tr. pulcherrimus* Gray?).—*Trochus rotellinus* Gld., FISCHER, Coq. Viv., p. 410, t. 120, f. 4.

I have not seen specimens of *Camitia*. Fisher's remarks under this species are as follows:

The shell above described is incontestably a *Camitia*, and very probably the *C. pulcherrima* figured by Adams and Chenu, but I have not been able to find the work in which *C. pulcherrima* was described by Gray in 1840. *Camitia* is a *Clanculus* very much depressed, like *Rotella*, and with a smooth shell like *Chrysostoma*, *Photinula*, etc. The right margin of the lip has the character of that of *Rotella*.

A copy of Adams' figure of *pulcherrima* is given on pl. 57, fig. 11.

C. GRAYI A. Adams.

Shell orbicular, convex-conoidal, very smooth, flesh-colored, ornamented with subquadrate rufous spots at the suture; periphery whitish, with two series of reddish-brown transverse spots; base whitish. (*Ad.* in P. Z. S. 1854, p. 42.)

Habitat unknown.

Genus CHRYSTOSTOMA Swainson, 1840.

Chrysostoma SWAINSON, Shells and Shell-fish, p. 353.

The operculum is corneous, thin, a little convex and shining within, a little concave outside, with fine radiating striæ; there are 5 whorls, the nucleus central. It will be seen that this organ resembles that of *Euchelus* rather than of *Umbonium* or *Trochus*. The radula has teeth considerably like *Monodonta* and *Diloma*. (See Troschel *Das Gebiss*, ii.)

C. PARADOXUM Born. Vol. X, pl. 45, figs. 91, 92.

Shell globular, imperforate or nearly so, thick and strong, with a porcelainous texture. Surface smooth, with scarcely visible lines of growth, the upper whorls microscopically, densely, spirally striated. Color whitish, closely reticulated and mottled all over with red or pinkish, often with a few large darker maculations above. Spire very short; sutures linear, bordered by a slight concavity of the whorl or margination. Whorls 6, convex, the last globular. Aperture half-moon shaped, reddish or golden-orange color within; parietal wall covered with a very thick orange-colored (rarely crimson) callus, which projects in a short tongue-shaped lobe above the slight, often closed, umbilical perforation.

Alt. 21, diam. 23 mill.; alt. 18, diam. 17 mill.

Singapore; Celebes; Mergui Archipelago; Philippines; New Caledonia.

Helix paradoxa BORN, Test. Mus. Cæs. Vindobon., p. 394, t. 13, f. 16, 17, 1780.—*Chrysostomus Nicobaricus*, etc., CHEMNITZ, Conchyl. Cab., v, p. 216, t. 182, f. 1822–1825, 1781.—*Turbo nicobaricus* GMEL., Syst. Nat. xiii, p. 3596.—PHILIPPI, Conchyl. Cab., p. 34.—REEVE, Conch. Icon., f. 48.—*Chrysostoma nicobaricum* Chem. CHENU, Manuel, f. 2618.—CROSSE, Journ. de Conchyl., xiv, p. 116, t. 5, f. 8 (*operculum*).—*Trochus nicobaricus* Gm., FISCHER, Genre Turbo, in Coq. Viv., p. 68, t. 36, f. 5.

ADDITIONS AND CORRECTIONS.

TROCHUS.

Page 21, add *Pl. 4, fig. 31*, after *T. TRISERALIS*.

Page 25, *T. callicoccus* Phil., read *Pl. 9, fig. 95*, not fig. 33.

Page 25, *T. smaragdus*, read *Pl. 9, fig. 94*, not fig. 39.

Page 26, *Tr. gibberula* Ad. is figured on *Pl. 9, fig. 4*.

Page 35, *T. bicrenatus*, read *Pl. 15, figs. 62-66*, not *Pl. 16*.

T. (INFUNDIBULOPS) FIRMUS Philippi.

Shell conical, solid, transversely sulcate, greenish, painted with close purple streaks; whorls a little subangular and plicate below the sutures, the last rounded-angulate; base nearly plane, obsoletely cingulate, false-umbilicate; aperture rhomboidal; columella very oblique, simple. (*Phil.*)

The shell is notably thick, rather conical; the individual whorls are level, angular above near the suture, and a little plicate, appearing somewhat terraced; the last passes into the base with a blunt angle; the sculpture consists of about 7 weak smooth transverse grooves on the upper surface, and about 4 scarcely elevated concentric girdles on the base. The funnel-shaped pit occupying the place of the umbilicus has a slightly elevated liration. The aperture is rhombic, the columella very oblique, entirely simple. On a pale green ground there are oblique purple-red streaks above; the base has red-spotted girdles. Alt. 18, diam. 22 mill.

Persian Gulf.

Trochus solidus JONAS, in Mus. Hamburg., not of *Phil.*—*Tr. firmus* PHIL., Conchyl. Cab., p. 317, t. 45, f. 5.

Allied to *T. erythræus* (page 40) but much smoother and differently colored.

CLANCULUS.

Page 79. *Gibbula multicarinata* Ten.-Woods.=*Clanculus nodiliratus* (= *C. plebeius* Phil., p. 79), according to Petterd, Quart. Journ. of Conch., Leeds, 1889, p. 354.

Page 80 (below middle of page). *Clanculus plebeius*, var. *rubicundus* Migh., read *Pl. 13, figs. 97, 98*, not 77, 78.

CLANCULUS RUBICUNDUS Dunker. Shell globose-conic, narrowly umbilicated, rubicund; whorls rounded, separated by canaliculate
(467)

sutures, elegantly granose-cingulate ; umbilicus with a white, crenate margin ; columella thick, twisted, incised above, passing into a thick tooth below ; lip thickened, sulcate within, and splendidly pearly.

Alt. 6, diam. about the same.

A beautiful species, allied to *T. corallinus* Gmel., but much slenderer, elevated riblets densely crenate, interstices canaliculate. Spiral riblets on penultimate whorl 4, on last whorl inclusive of base, 12-14. Color uniform ruddy or scarlet, variegated with white in the umbilical region. (Dkr., in Mal. Blätt., xviii, p. 168, 1871.)

Viti Is.

I suppose this to be the form I mentioned as "*rubicundus* Migh." in treating of *Clanculus plebeius*. See page 80.

CLANCULUS ASSABENSIS Caramagna. Pl. 51, fig. 4.

Shell conoid, turbinate, thick, umbilicate ; spire subconic, as long as the aperture ; whorls 6, first two smooth, mamillated, whitish, the third whitish, obsoletely spirally funiculate ; the rest ornamented with regular, rounded, crenulate granulose spiral cords ; granules close, formed by axial sulci ; last whorl with about 12 cords ; the periphery subangularly rounded, base little convex ; umbilicus very narrow, deep ; aperture subquadrangular ; columellar lip below with 2 or 3 delicate folds ; outer lip plicate within ; sutures canaliculate. Surface whitish, with ashen or wine-tinted spots in oblique series.

Alt. $8\frac{1}{2}$, diam. 9 mill.

Assab, Red Sea.

MONODONTA.

Page 94. Figure 28 of pl. 21 is not *M. crassa*, but *M. turbinata*.

Page 106. After *M. neritoides* Phil., add Pl. 38, figs. 20, 21, and the habitat *Japan*. The figures on pl. 38 are copied from Dunker ; they are much more globose than Philippi's, and may prove distinct.

DILOMA NANA Gould. *T. minuta*, fusca, ovato-globosa ; anfr. 4, convexus, bene discretis, apicali simplicibus, alteris liris et sulcis angustioribus cinctis ; liris ordinatim quasi plicatis ; basi rotundato, pallidiori, vix perforato ; columella arcuata, denticulata ; labro intus undulato ; fauce livida, diam. 5 mill. (*Gld.* in Proc. Bost. N. H. viii, p. 18).

Loo Choo.

DILOMA VERRUCA Gld. *T. parvula*, ovato-conica, dilute rosacea ; anfr. 4 ; convexus, sutura canaliculata sejunctis, liris binis elevatis

cinetis, tribus minoribus antice, duobus postice additis, lamellis incrementi decussantibus ad decussationes dilatis; basi convexo, arcute perforato; dente collumellari parvo, labro crenulato, intus. sulcato. Axis 4, diam. 3 mill. (*Gld., l. c., p. 18*).

Coral Seas, China.

CANTHARIDUS.

CANTHARIDUS RAMBURI Crosse, page 127.

My treatment of this form has recently been criticized (*Journ. de Conchyl.* 1889, p. 245). If it is conspecific with *C. leseueri*, as I believe, it will of course take specific rank, the latter name being retained for the variety. My disregard of the rule of priority was an oversight.

CHLOROSTOMA.

Page 194. *Chlorostoma turbinatum*. Adams proposed the name CH. FUSCUM for *Ch. turbinatum* Ad. P. Z. S. 1851, p. 183, not *Ch. turbinatum* Ad., lib. cit., p. 182. See P. Z. S. 1851, p. 305.

C. PFEIFFERI Dohrn., p. 189.

This name being already in use in *Chlorostoma* for an umbilicated Japanese species, the form may be known as CHLOROSTOMA DOHRNI Pilsbry. In the 10th line of the description, read 'fine growth lines,' instead of 'five growth lines.'

GIBBULA.

GIBBULA MAGUS L., page 197.

A variety PRODUCTA has been characterized by Buq., Dautz. and Dollfus. It is smaller than the type, more conical, more gibbous; less tumid below the sutures; umbilicus narrower. *Gibbula protumida* Locard, Prodr. de Malac. Française, in Ann. Soc. Linn. Lyons, 1885, p. 243, is a synonym.

Page 204. *G. nebulosa* Phil. Pl. 63, figs. 15, 16, do not represent this species. It is figured on pl. 51, figs. 16, 17.

Page 234. *Tr. australis* Tenison-Woods ("Census")=full grown *G. depressa* Ten.-Woods, according to Petterd. (*Journ. of Conch., Leeds*, 1879, p. 354.)

Page 239. Read after *G. tryoni*, Pl. 57, figs. 20, 21, not pl. 69.

MONILEA.

MONILEA CALYCVLUS Wood, Pl. 61, fig. 13 ; pl. 41, figs. 14-17.

This form is doubtless distinct from *M. callifera* Lam., with which it is confused in the synonymy of that species on p. 247. *T. masoni* Nevill is synonymous. See Proc. Zool. Soc. 1878, p. 818 (article by E. A. Smith).

Andaman Is.

MINOLIA.

MINOLIA CAIFASSII Caramagna. Pl. 51, figs. 2, 3.

Shell conoidal, umbilicated, very fragile ; whorls $5\frac{1}{2}$, angular, flat above ; the first 3 smooth, the remainder minutely cingulate, granose, obliquely striate, ornamented with chestnut-brown radiating spots and whitish ; last whorl angular at base, convex below, and ornamented with 7 minutely grained concentric liræ ; umbilicus ample, scalariform, cingulate, granose, bounded by a white crenate riblet.

Alt. 5, diam. 5 mill.

Assab, Red Sea, 20 meters.

Minolia caifassii CAR. Bull. Soc. Mal. Ital. 1888, p. 126, t. 8, f. 1.

CALLIOSTOMA.

CALLIOSTOMA QUADRISULCATUM Philippi. Pl. 59, fig. 9.

Shell imperforate, exactly conical, somewhat elevated, pale yellow, sculptured with 4 rounded riblets as wide as the intervening furrows ; whorls 7-8, plane, the last angular ; base nearly flat, with about 8 concentric grooves. Aperture almost exactly rhombic ; columella *very oblique*, cylindrical, scarcely truncate at base, and with a little groove outside. Alt. 15, diam. 16 mill. (*Phil.*)

Tr. quadrisulcatus PHIL., Zeitschr. f. Mal. 1848, p. 124 ; Conchyl. Cab., p. 259, t. 38, f. 8.

This species may belong to *C. conuloides*. Its habitat is unknown.

CALLIOSTOMA LURIDUM (Nuttall) Reeve. Pl. 65, fig. 79.

Shell conical, whorls flatly sloping, rather tumid at the base, smooth or malleated, sometimes spirally linearly engraved ; burnt-brown, very obscurely luridly flamed. (Ree. in Conch. Icon., Monog. *Zizyphinus*, f. 24, 1863.)

Said by Reeve to be from California, but unknown to American Conchologists there.

Trochidæ of undetermined systematic position.

MARGARITA CUMINGII A. Adams. Shell elevated-conical, cinereus, painted with brown undulating lines, broadly umbilicated; whorls ornamented with transverse riblets, the last with 3 median liræ, longitudinally elevated striate; umbilicus large, encircled by a crenulated cingulus, within elegantly decussated by radiating and transverse lines. (P. Z. S. 1851, p. 191.)

Philippines.

MARGARITA VARIABILIS A. Adams. Shell orbiculate-conic, sub-depressed, broadly umbilicated, pallid, painted with brown and gray, varied with white; whorls rounded, transversely deeply sulcate; umbilicus perspective, margin crenulated; base nearly plane; labial margin subcrenulated. (P. Z. S. 1851, p. 191.)

Habitat unknown.

MARGARITA BALTEATA A. Adams. Shell orbiculate-conic, scarcely umbilicate, grayish, tessellated with brown; whorls gibbous, deeply sulcated transversely; last whorl subangular; base rather flattened, concentrically sulcate; columella curved, scarcely truncate.

(P. Z. S. 1851, p. 191.)

Habitat unknown.

MARGARITA TESSELLATA A. Adams. Shell depressed-conical, broadly umbilicated, smooth, cinereus, regularly tessellated with gray; whorls rather flattened, the last subangular; base convex; umbilicus white inside; aperture rotund, iridescent with green inside. (P. Z. S. 1851, p. 191.)

MARGARITA DILECTA A. Adams. Shell orbiculate-conic, broadly umbilicate, shining, whitish, radiately painted with rufous flames; whorls convex, ornamented with elevated acute cinguli, crenulated above, the interstices closely longitudinally striate; base convex, whitish, nearly smooth, radiately striate; umbilicus perspective, margin crenulated. (P. Z. S. 1854, p. 40.)

Straits of Magellan (Cuming).

MARGARITA ASPECTA A. Adams. Shell turbate-conic, broadly umbilicate, grayish, gold-shining, maculated with brown; whorls rounded, excavated at the sutures, ornamented with elevated crenulated subdistant cinguli, the interstices longitudinally striate; base convex, concentrically cingulate; umbilicus large, open, bounded by

an elevated ridge, inside decussated by concentric liræ and radiating lines. (P. Z. S. 1854, p. 40.)

Australia, Mus. Cuming.

Sowerby's figure (Conch. Icon. *Margarita*, f. 25) is copied on my pl. 61, fig. 37.

MARGARITA PULCHERRIMA ("A. Ad.") Sowerby. Pl. 37, fig. 1.

Shell raised, trochus-shaped, rather distantly spirally ridged, between the ridges regularly striated; ridges minutely beaded, spotted with red; umbilicus large, keeled; columella oblique. (*Sowb.*)

Japan.

M. pulcherrima ('A. Adams. — ?') SOWERBY, JR. in Reeve, Conch. Icon., f. 11.

Probably belongs to *Minolia*.

MARGARITA MARMOREA Pease. Shell somewhat depressedly turbinate; spire short, spirally striated; aperture circular, umbilicate; inner lip reflected over the umbilical region. Color light green, clouded with white and green of different shades, and marked with occasional longitudinal and oblique zigzag lines of dark green.

(W. H. Pease, in P. Z. S. 1860, p. 435.)

Sandwich Is.

The following six descriptions are from Proc. Bost. Soc. Nat. Hist. viii, 1861, p. 15, 16. They are reprinted in the original order.

MARGARITA IANTHINA Gould. T. globoso-conica, dilute ianthina, striis crebis volventibus cincta, satis umbilicata, ad peripheriam subangulata; anfr. 6+, ventricosis; sutura profunda; apertura rotundata, antice subangulata; columella recta, acuta; fauce margaritacea. Axis 8, diam. 20 mill.

Arctic Ocean.

Similar in form and size to *L. shantarica* Midd., but thinner, more angular, differently colored, and with a much larger umbilicus. (*Gld.*)

MARGARITA MUSIVA Gould. T. pyramidalis, margaritacea, crusta cinerea, fusco tessellata induta; anfr. 6, ultimo tricarinato, (ceteris bicarinatis); base convexiusculo, polito; umbilico amplo, conico, carina plicata marginato; apertura circularis; columella vix reflexa, ad carinam umbilicalem terminante. Operculum corneum, lineis incrementi concinne granulatis. Axis 6, diam. 5 mill.

Hong Kong Harbor, 10 fms.

Allied to *M. carinata*, *biangulosa*, etc. (*Gld.*)

MARGARITA ARTICULATA Gould. T. parva, globoso-conica, livescens; anfr. 6, rotundatis, ultimo filis circ. 5 (ceteris 3) cinctis, juxta suturam excavatis; filis coloribus pallidis et obscuribus alternantibus articulatis, interspatiis concinne clathratis; basi nitido, concentrice striato; umbilico amplo, eleganter plicato; apertura circularis, labro tenui. Axis 5, diam. 6 mill.

Simon's Bay, Cape of Good Hope.

MARGARITA MUSTELINA Gould. T. minute, tenuis, globoso-conica, infra concentrice striata, livida albo prope suturam parce strigata; anfr. 4, ventricosus; peripheria obtuse angulata; basi rotundato, late perforato; apertura ovata; columella tenui, arcuata.

Diam. 4, axis 3+ mill. (*Gld.*)

Hakodadi Bay.

MARGARITA LENTICULA Gould. T. minuta, depressa, lenticularis, concavo-convexa, lactea, striis tenuissimis ordinatis cincta; anfr. 4, declivibus, prope suturam excavatis; area umbilicali lira in labio desinente cincta; oblique et arcte perforata; aperture rotundata, quadammodo transversa; columella cylindrica, umbilico obvia. Axis 3, diam. 5 mill.

Sea Shore, Loo Choo.

This pretty depressed species may very likely belong to a distinct genus; but I find no other one that will better receive it. (*Gld.*)

MARGARITA PINTADO Gould. T. parva, ovato-globosa, depressa, tenuis, cinerea; anfr. 5, ventricosus, juxta suturam plarulatis, liris 5 volventibus fusco et albo articulatis cincta; basi rotundato, late perforato, concentrice sulcato et articulado; apertura rotundato-ovata; labro tenui; columella incrassata, nacreæ, antice cuspidata.

Axis 4, diam. 5 mill.

Simon's Bay, Cape of Good Hope, 12 fms.

Characters in many respects like those of *Monilea* rather than of *Margarita*. (*Gld.*)

T. GUILLARDI de Folin. Pl. 57, figs. 39, 40.

Shell small, globose, apex obtuse, suture well defined, regularly longitudinally striate, pale, spire short; whorls 5, the last large, base somewhat depressed, profoundly umbilicate; aperture circular, margins simple; operculum corneous, slightly concave, with 6 whorls.

Alt. 5, diam. 4 mill. (*de Fol.*)

Pacific Ocean.

Turbo guillardii DE FOL., Les Méléagriniques, p. 52. t. 5, f. 9, 10, 1867.

May be a *Gibbula* allied to *amirantium*, *tasmanica*, etc.

T. GAUDICHAUDII Hupe. Pl. 61, figs. 34, 35.

Shell ovate-rotund, obliquely depressed, imperforate, black, shining, spire short, obtuse; whorls 4, convex; base rounded; sutures margined; aperture patulous, rounded; right lip acute; columella wide, flattened or concave; operculum corneous.

Alt. 5, diam. 8 lines. (*Hupe.*)

Valparaiso, Chili.

T. gadichaudii HUPE, in GAY, Hist. fis. y polit. de Chile. Zool. viii, p. 146, atlas, Malac. t. 4, f. 4 (1854).

This species, unknown to me except for the above description, looks like *Turbo* (*Prisogaster*) *elevatus* Soul.

T. MALOUINUS d'Orbigny. *Unfigured.*

Shell conical, thin, umbilicate, transversely striate, whitish; spire conical, apex obtuse; whorls 4, convex, the last subangulate, with the suture excavated; aperture rotund-subangulose, lip thin, acute; columella acute. Alt. $2\frac{1}{2}$, diam. 3 mill. (*Orb.*)

Falkland Is.

Trochus malouinus ORB., Voy. dans l'Amér. Mérid., p. 411.

T. BICINCTUS Philippi.

Shell small, conical, perforate, transversely striate, white, radiated with rose, angular below the suture, the angle nodose; last whorl carinated in the middle; base rounded; aperture as high as wide, throat striated, columella arcuate, terminating in a bipartite tooth at the base. (*Phil.*)

There are 5 whorls; above the shoulder-angle there are two shallow spiral furrows; between this and the peripheral carina there are 4, of equal breadth to the elevated interspaces; and on the base about 12. Alt. 7, diam. 7 mill.

Red Sea.

Tr. bicinctus PHIL., Zeitschr. f. Mal., p. 102; Conchyl. Cab., p. 230, t. 35, f. 2.

Has the outline of *Priotrochus*, but differs in the columella with bipartite basal tooth.

TROCHUS MILLELINEATUS Bonnet. Pl. 22, fig. 55.

Shell with a very deep umbilicus, nearly reaching to the apex ; thick, little shining, yellowish, with elongated flexuous unequal brownish-green spots and dots of the same color. Spire little elevated, acute ; whorls 6, obliquely striate, the last very large, with numerous irregular spiral ridges, stronger and numbering 6 on the base, with obliquely striate interstices. Aperture oblique, rounded, nacreous with greenish reflections and showing the folds inside.

Alt. 19, diam. 21 mill.

Torres Straits (?).

Trochus (monodonta) mille-lineatus BONNET, Revue et Mag. de Zoologie, 1864, p. 281, t. 22, f. 5.

My description is taken from that of Bonnet. The original figure is copied. Bonnet gives for locality, "Jorres straits." I do not know the systematic position of this shell.

MARGARITA SANDWICHIANA ("Ad.") Sowerby. Pl. 37, fig. 31.

Shell subglobose, grayish fulvous, spirally striated, variegated with blackish-brown tessellated spots ; whorls 3, last large, subglobose ; aperture rather round ; columella rather thick, oblique ; umbilicus broad. (*Sowb.* in *Conch. Icon.* xx, f. 8.)

Sandwich Is.

MARGARITA COSTELLATA Sowb. Pl. 37, figs. 10-12.

Shell orbicular obtuse-conic, thin, brownish ; whorls 4, tumid, spirally ribbed, base subangulated, aperture suborbicular, subangulate below ; umbilicus small.

Greenland.

M. costellata SOWB. *Conch. & Mal. Mag.*, p. 26 ; *Conch. Ill.*, f. 15. —Philippi, *Conchyl. Cab.*, p. 245, t. 37, f. 3.

T. METAFORMIS Philippi. Pl. 67, fig. 53.

Shell turreted-conic, subperforate, thin, shining, olivaceous, painted with scarcely visible spiral red lines ; whorls nearly flat, a trifle turgid, the last acutely angulated, $\frac{1}{3}$ the total length of shell ; aperture subrhombic ; columella little oblique, entire, cylindrical.

Alt. 10, diam. $6\frac{2}{3}$ mill. (Phil.)

Habitat unknown.

T. metaformis Phil., *Zeitschr. f. Mal.* 1849, p. 168 ; *Conchyl. Cab.*, p. 296, t. 43, f. 13.

T. PYGMÆUS Philippi. Pl. 39, figs. 29, 30.

Shell small, very thin, globose-conoid, umbilicate, whitish; whorls rounded, a little depressed or tabulate at the sutures, superficially spirally sulcate; aperture rhombic-circular; umbilicus crenulated.

Alt. 2, diam. $2\frac{1}{3}$ mill. (*Phil.*)

Magnisi, Sicily.

Tr. pygmæus PHIL., Enum. Moll. Sicil. ii, p. 153, t. xxv, p. 13.

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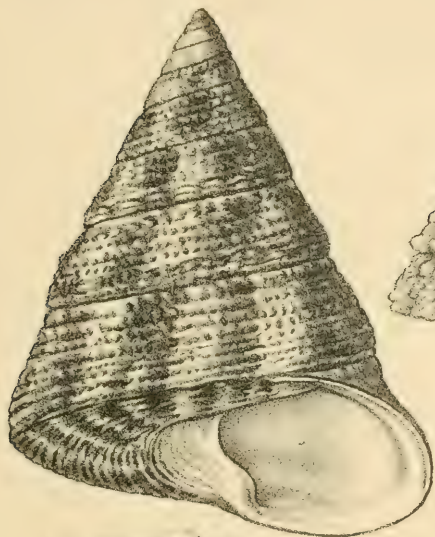
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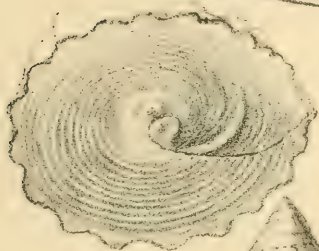
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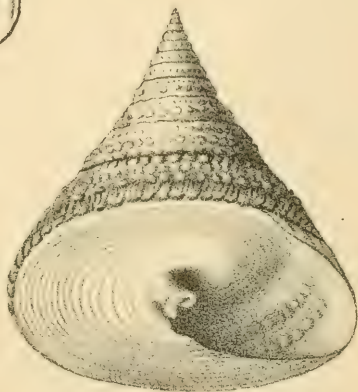
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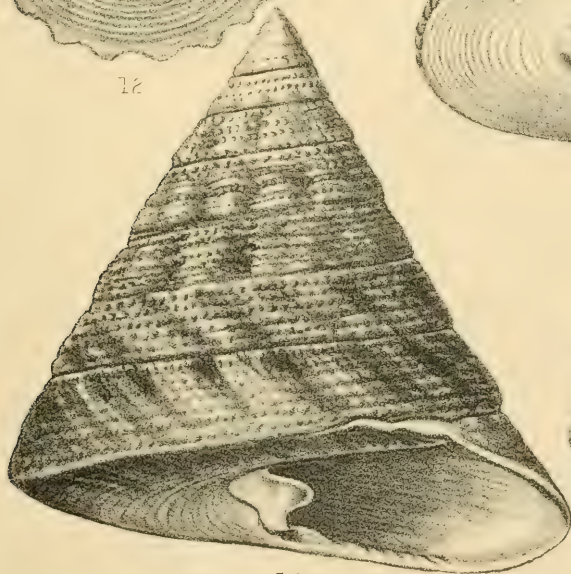
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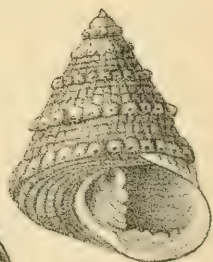
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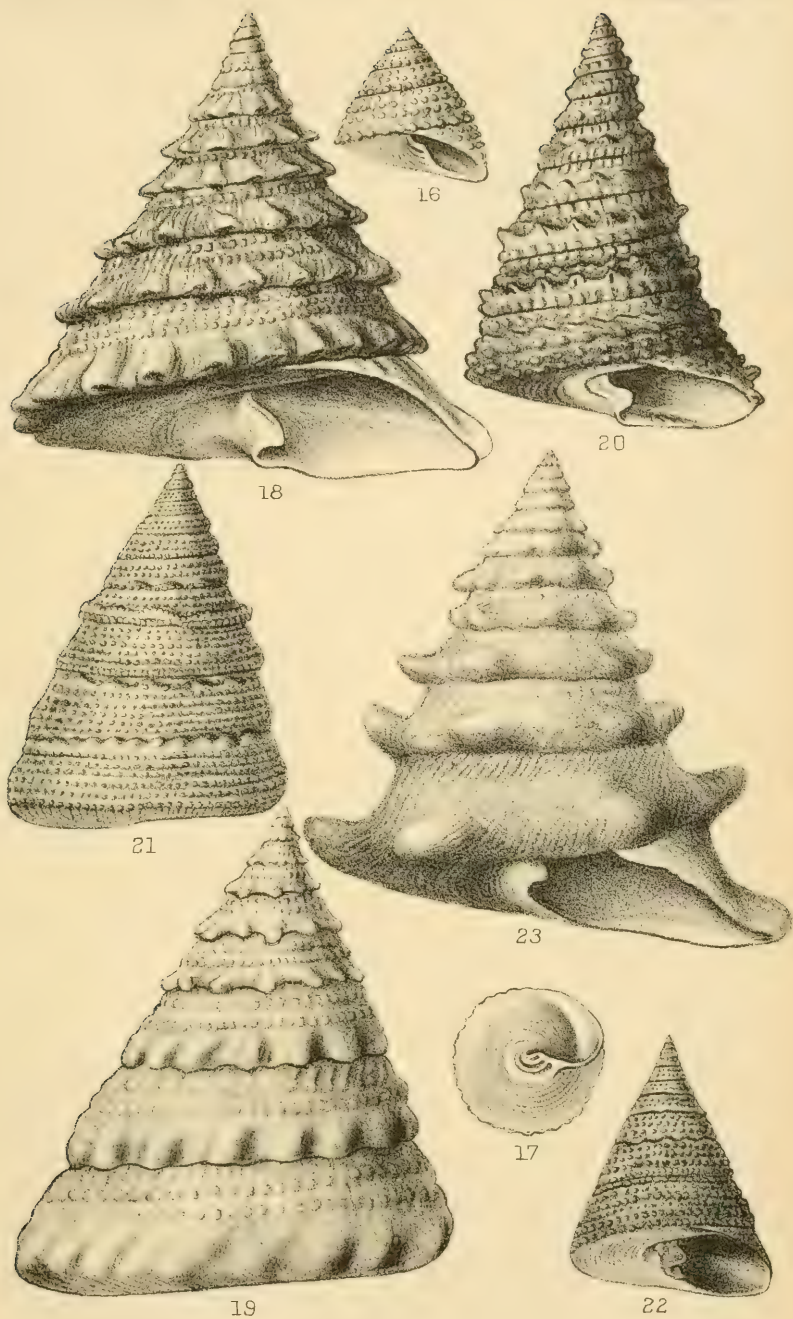
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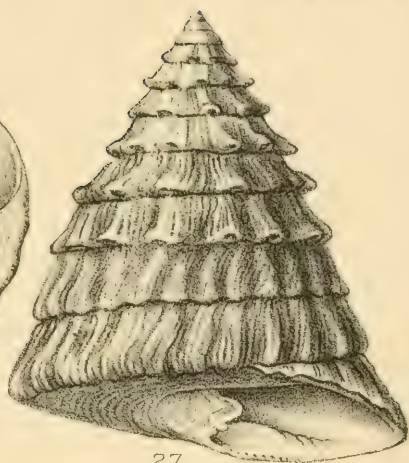


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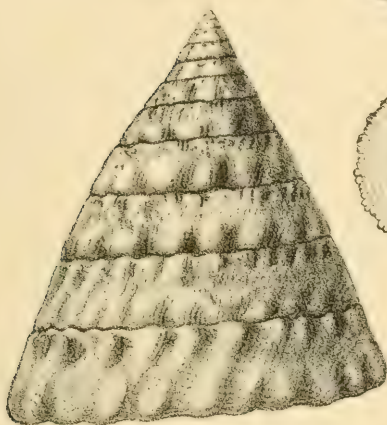




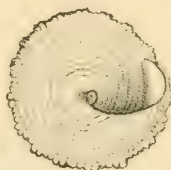
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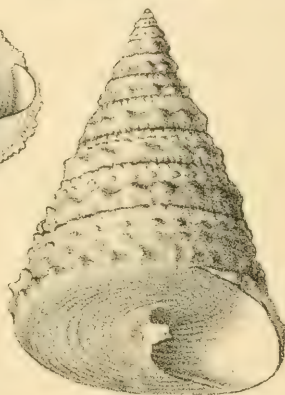
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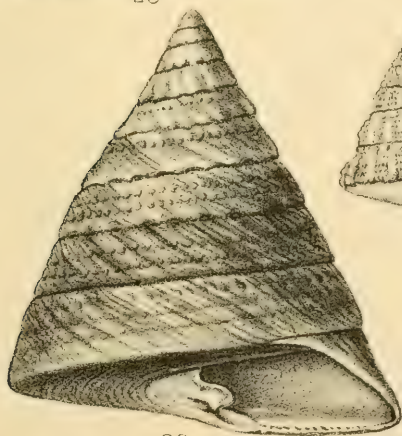
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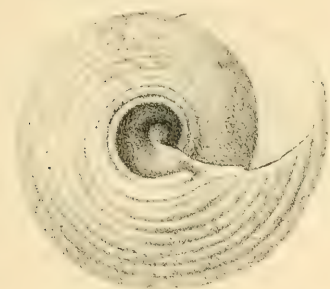
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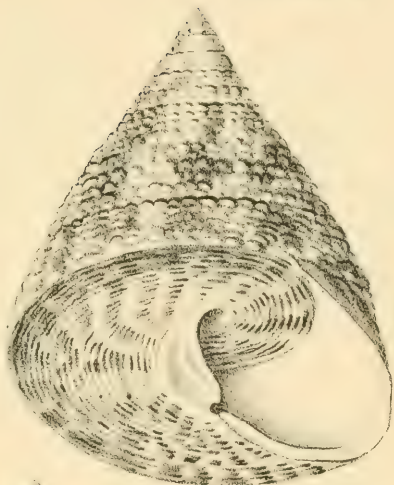
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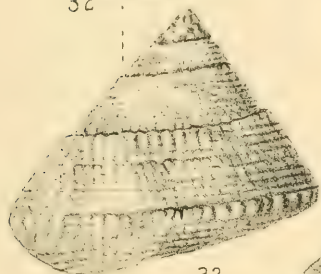
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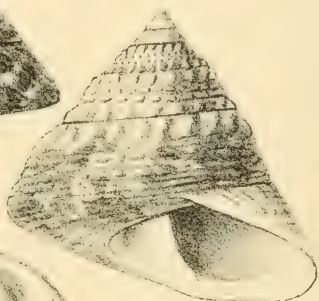
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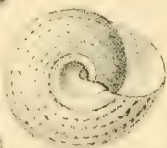
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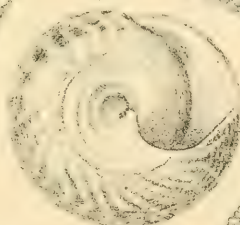
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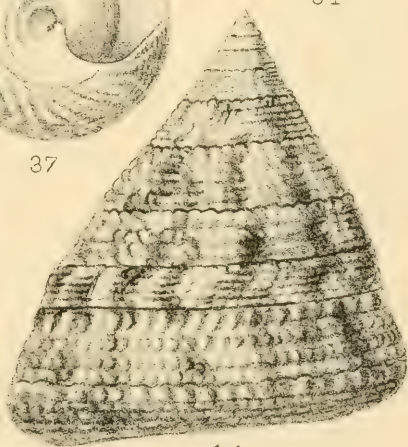
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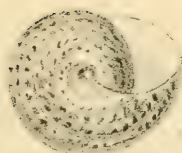
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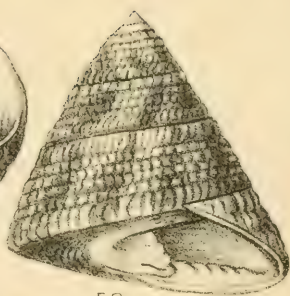
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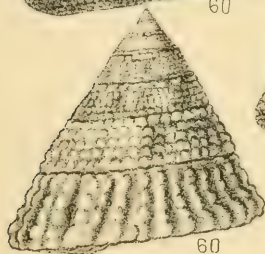
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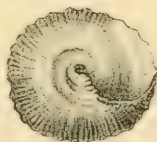
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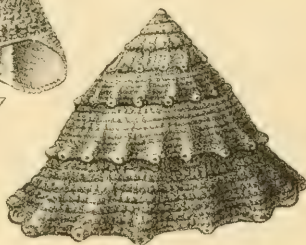
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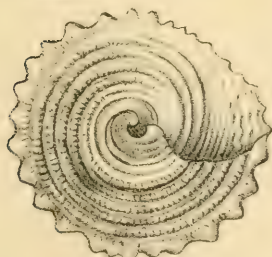
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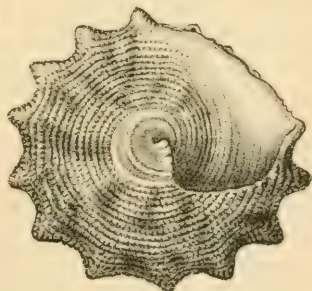
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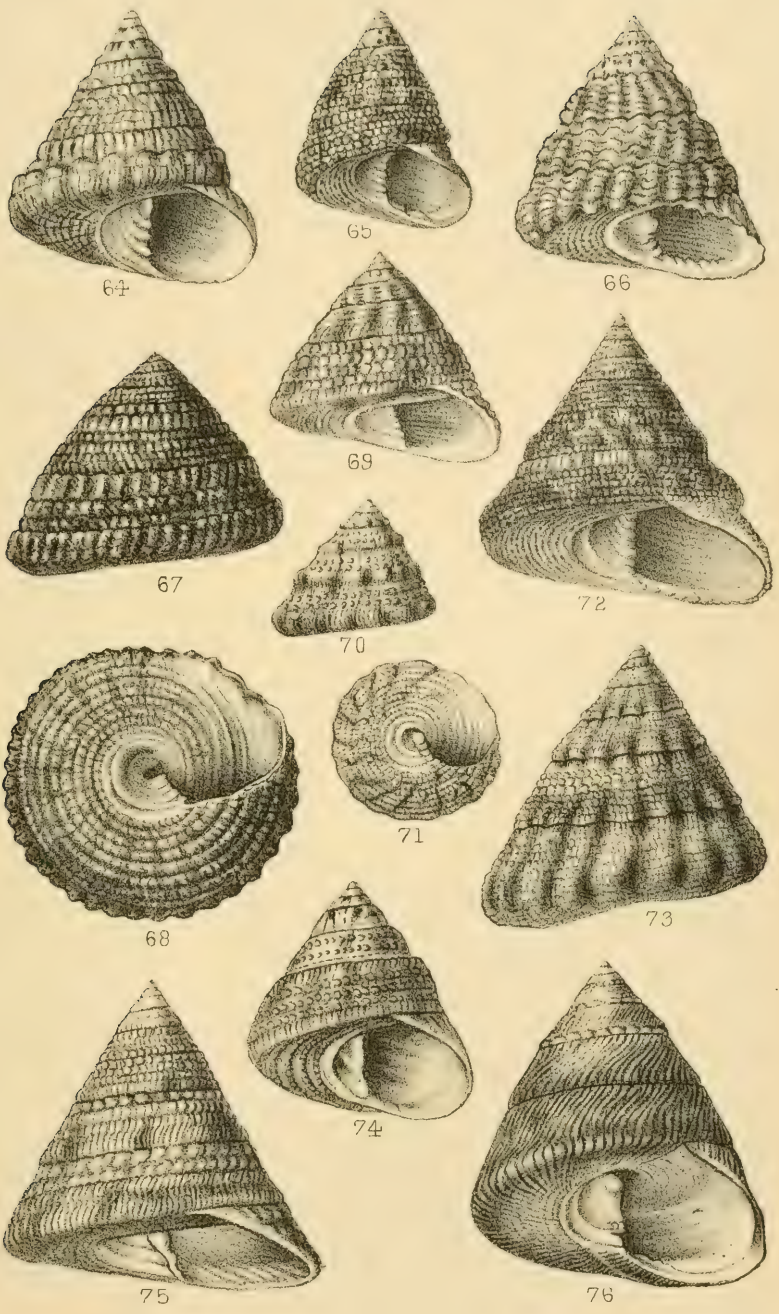
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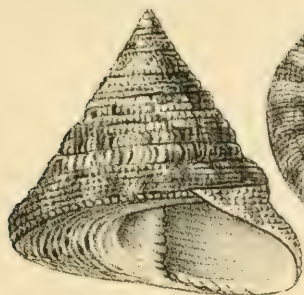


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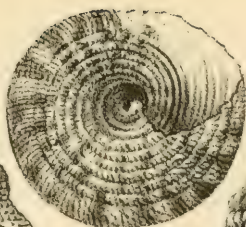


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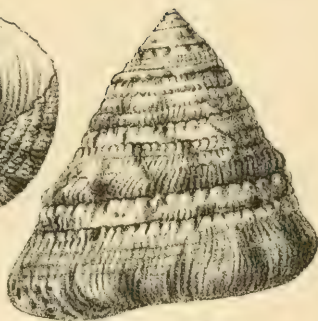




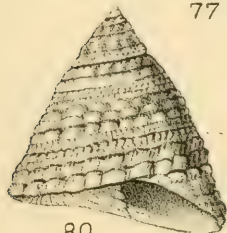
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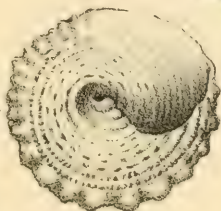
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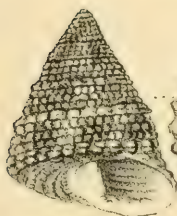
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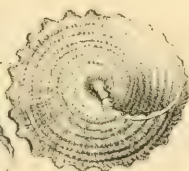
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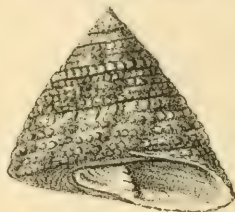
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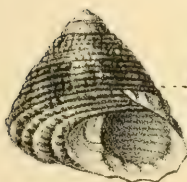
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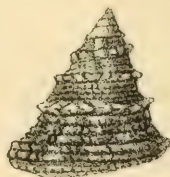
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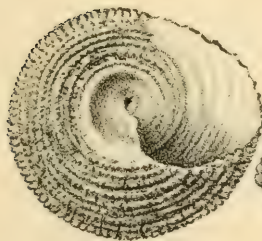
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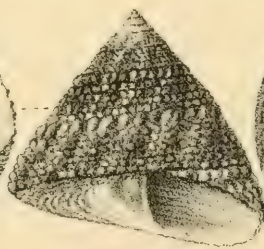
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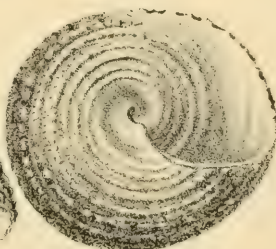
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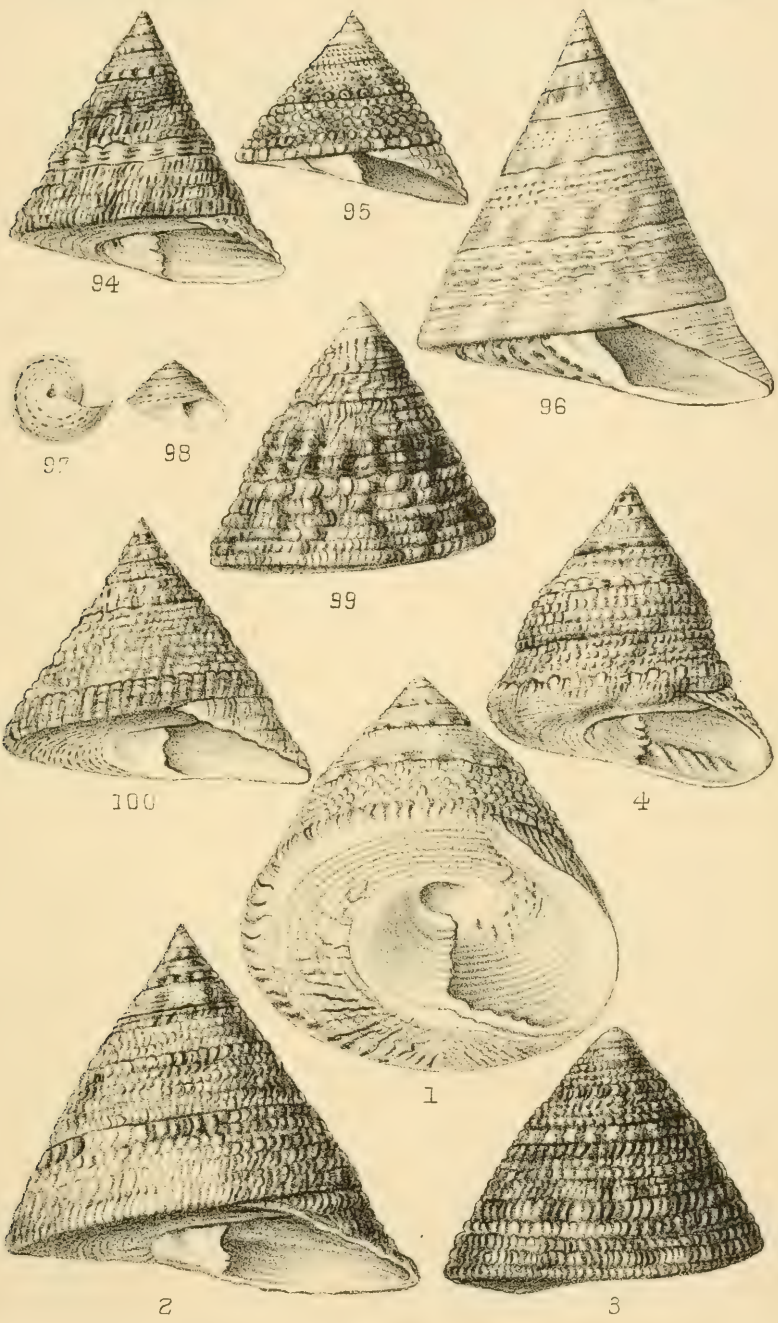
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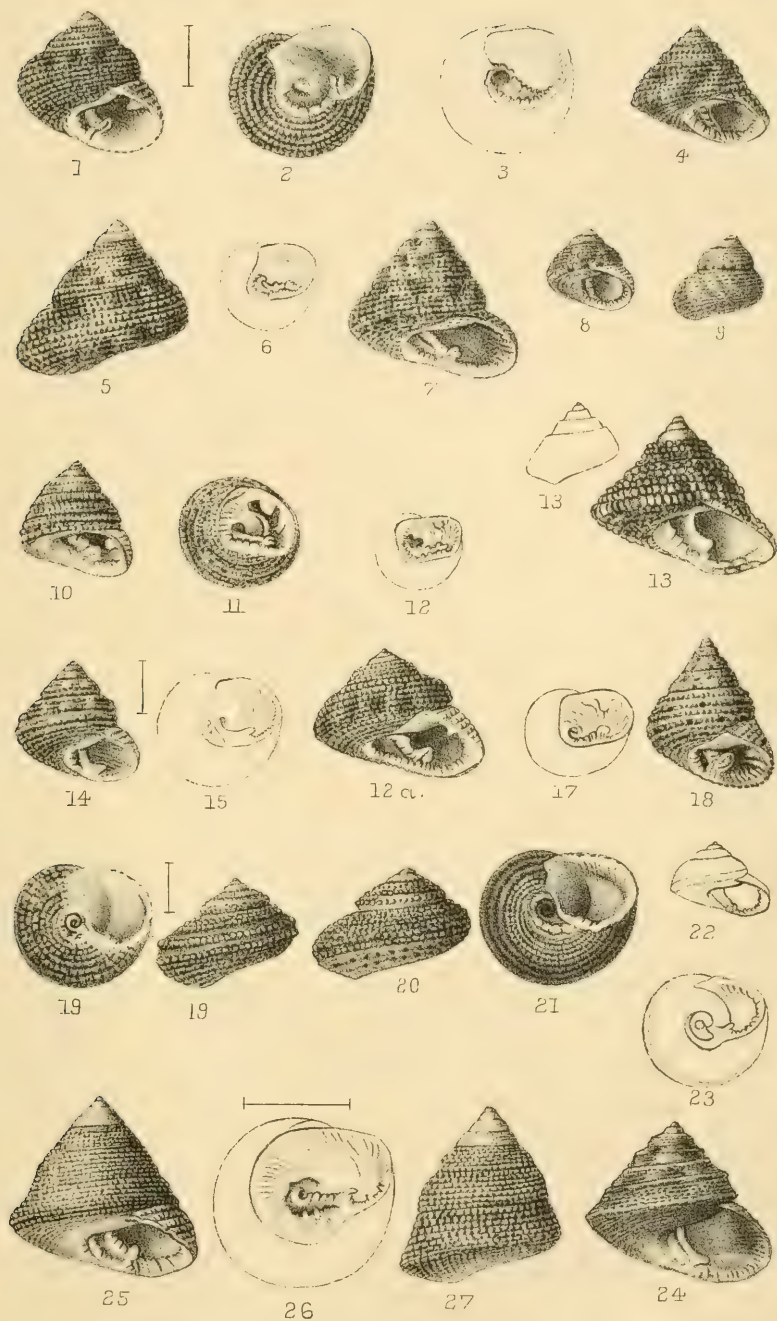


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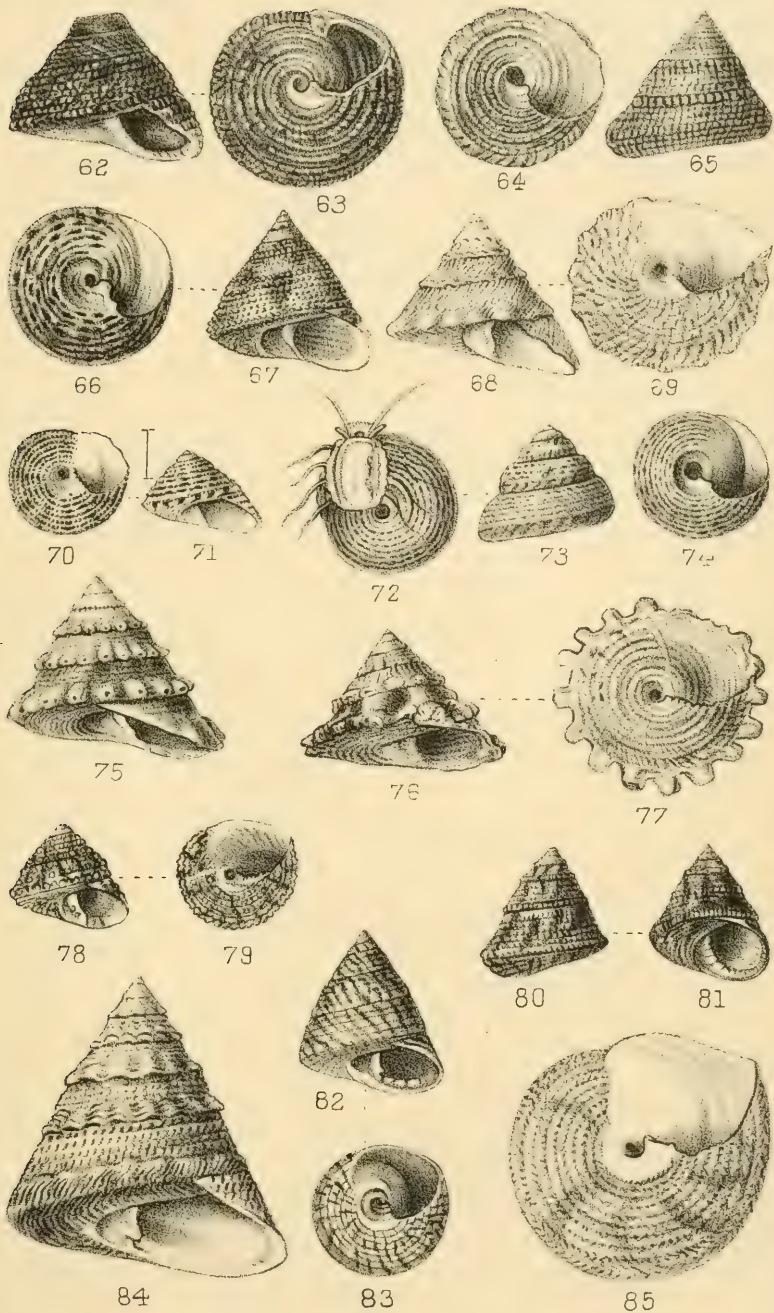


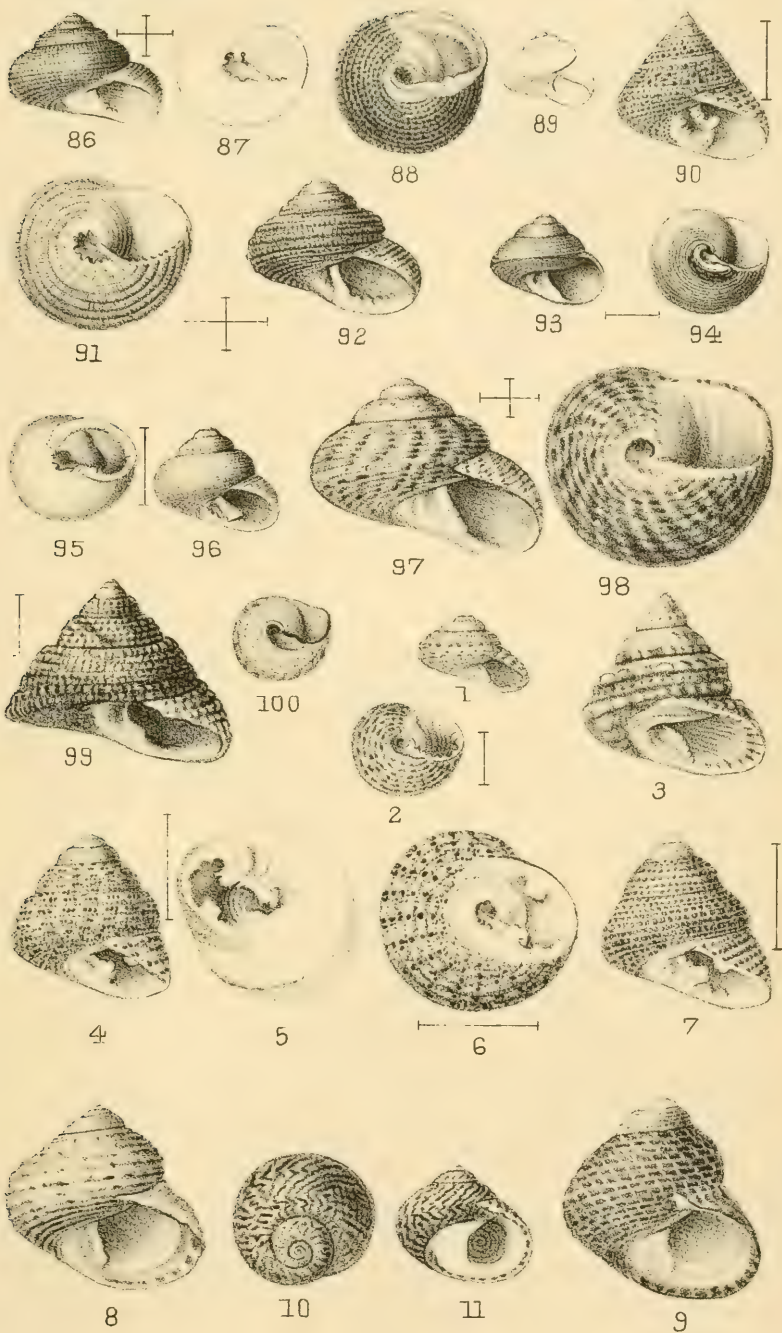
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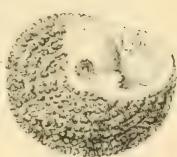








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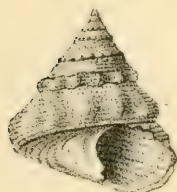
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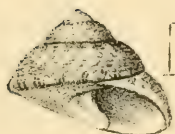
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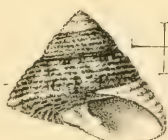
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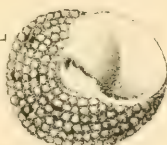
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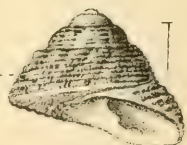
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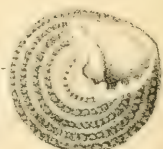
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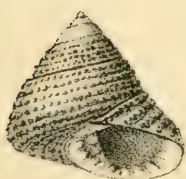
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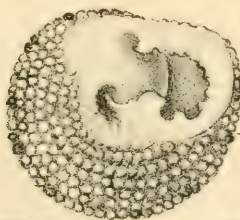
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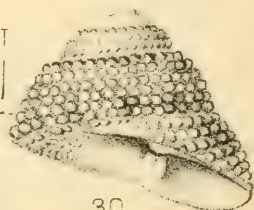
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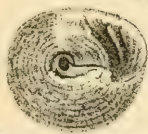
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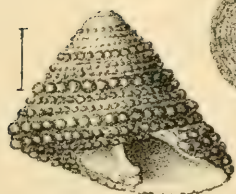
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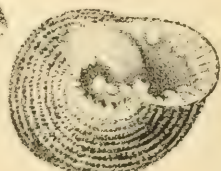
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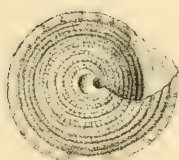
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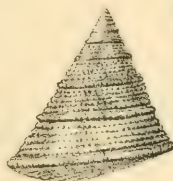
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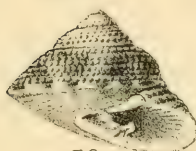
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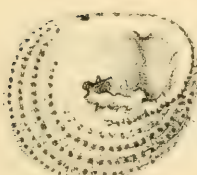
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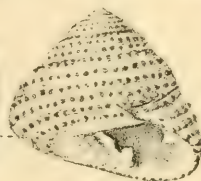
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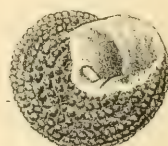
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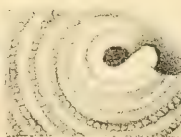
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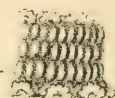
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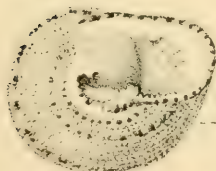
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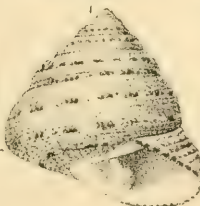
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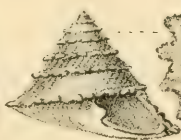
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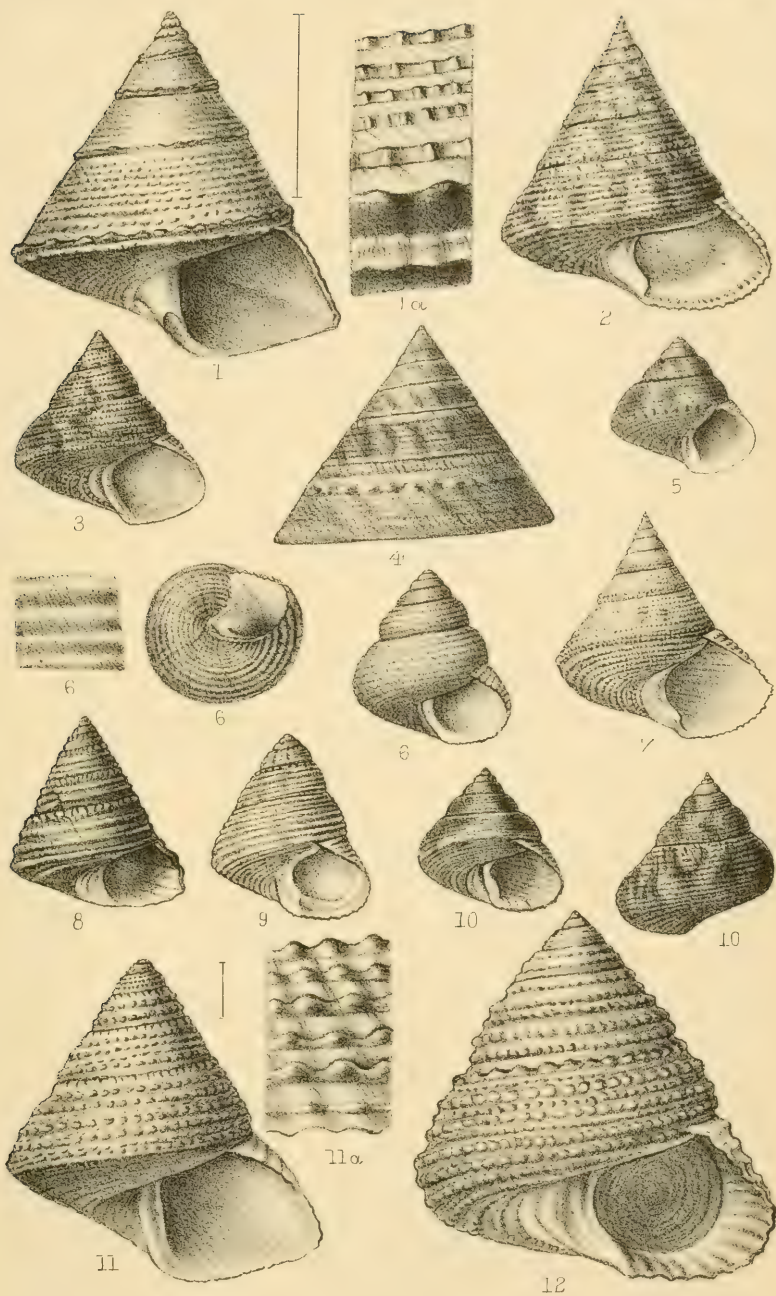


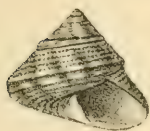
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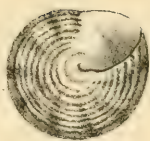
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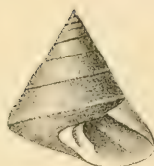




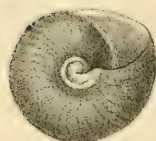
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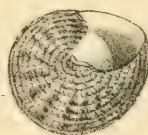
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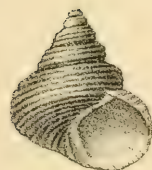
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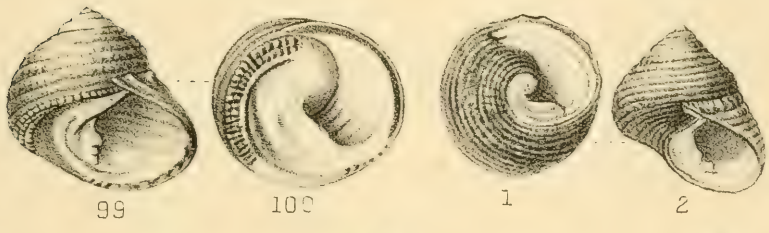
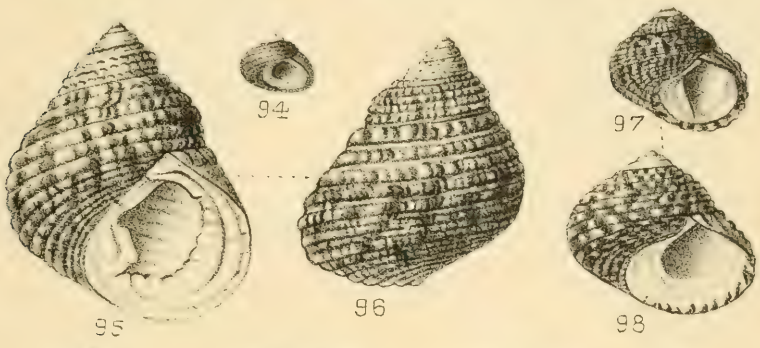
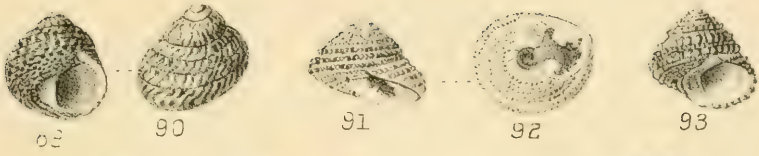
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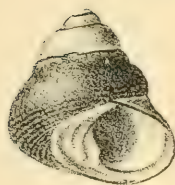
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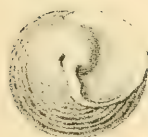
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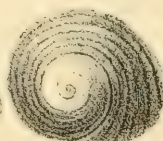
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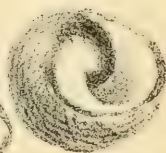
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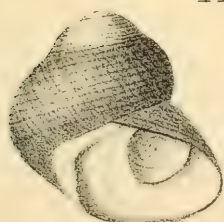
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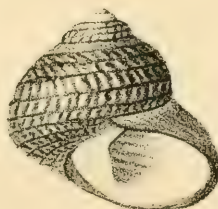
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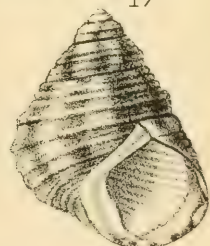
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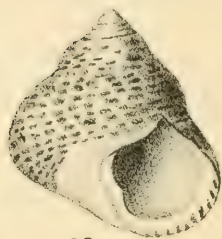
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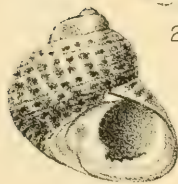
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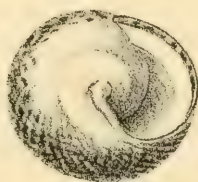
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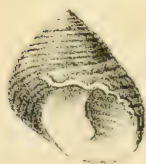
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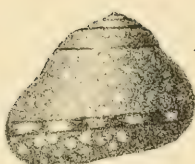
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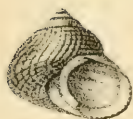
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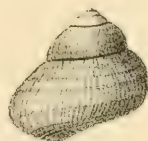
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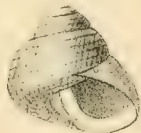
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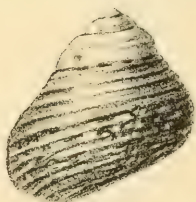
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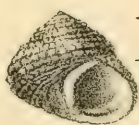
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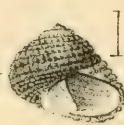
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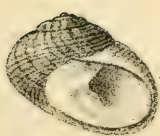
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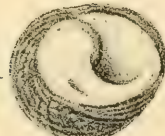
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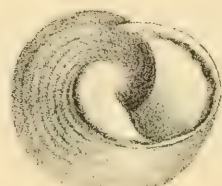
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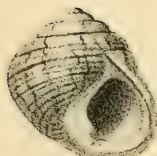
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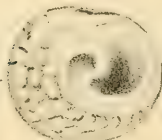
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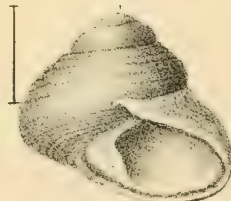
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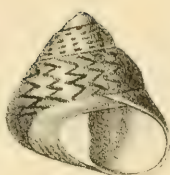
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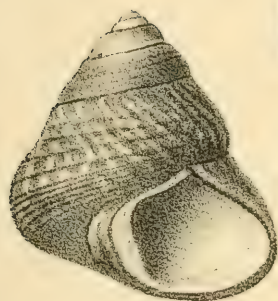
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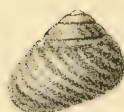
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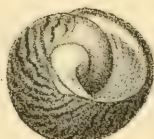
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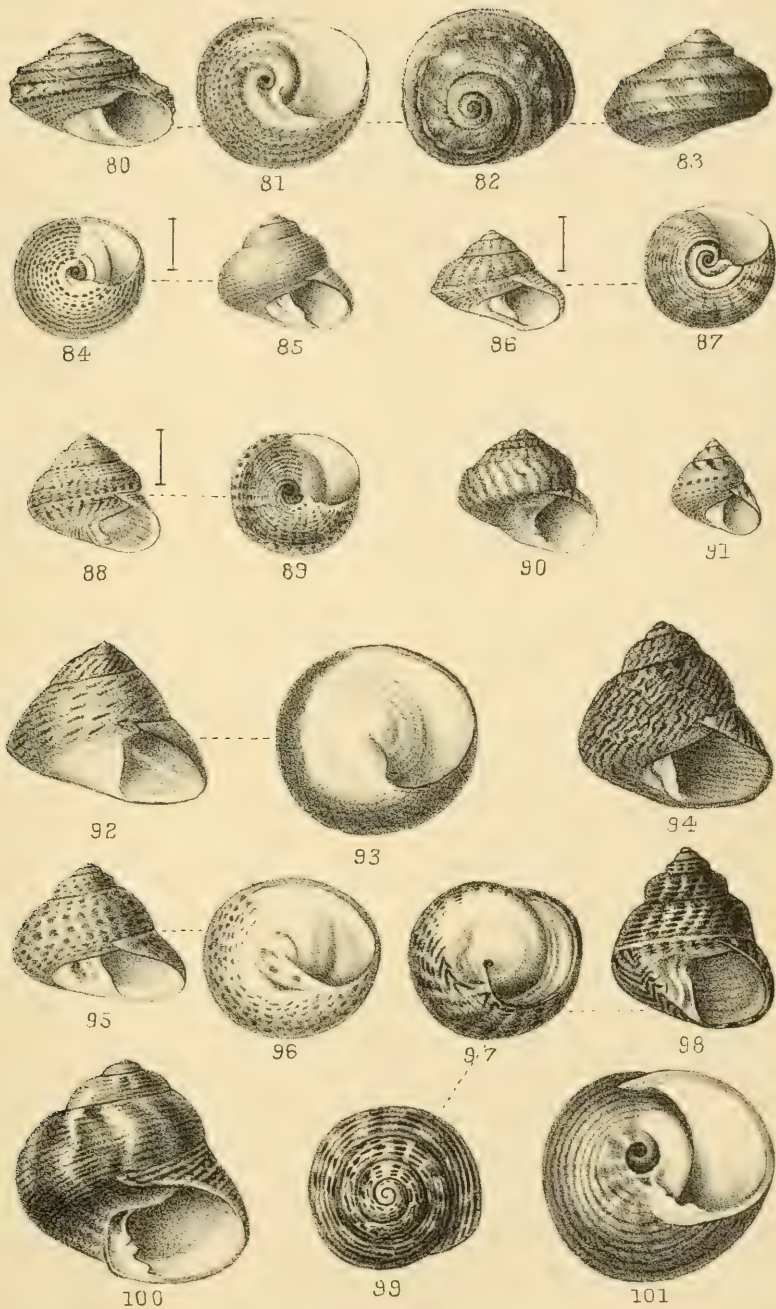
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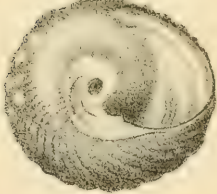




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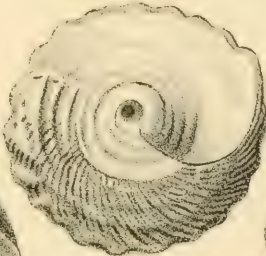
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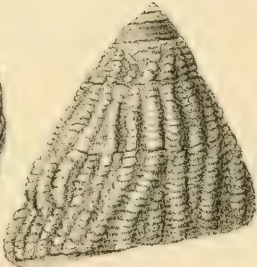
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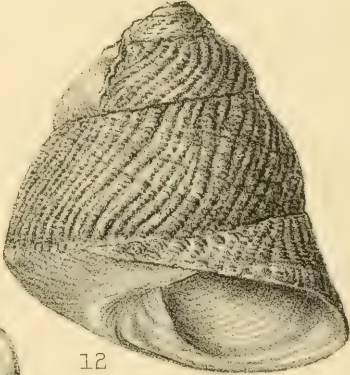
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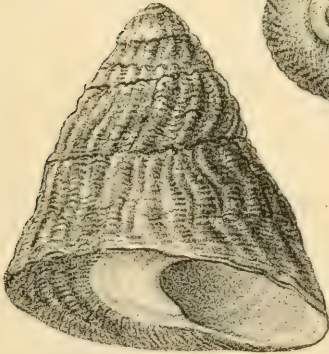
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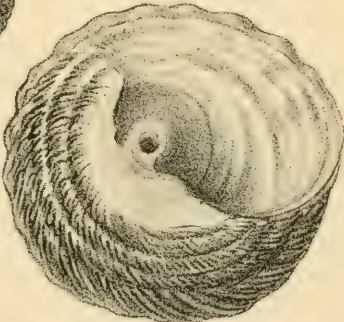
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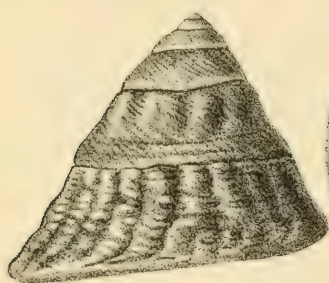
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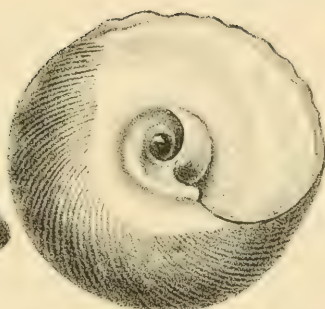
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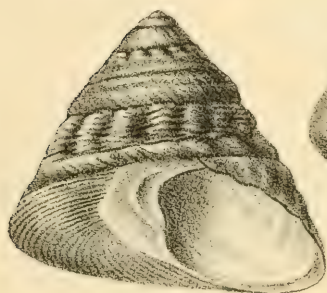
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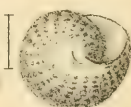
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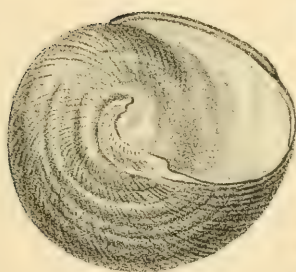
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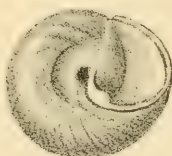
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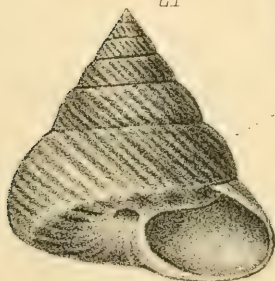
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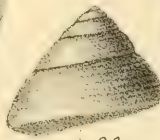
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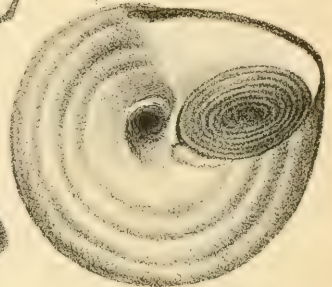
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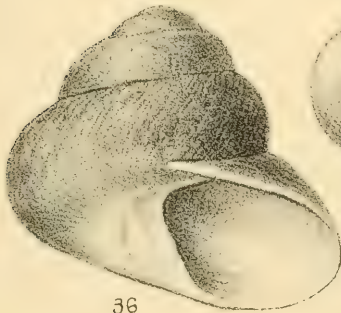
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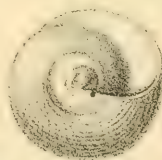
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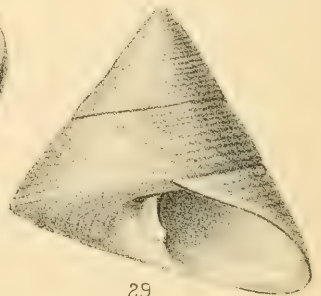
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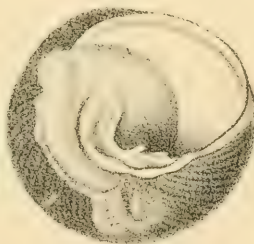
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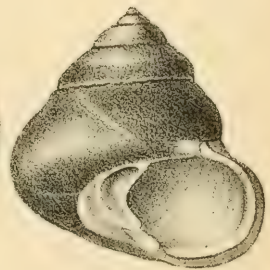
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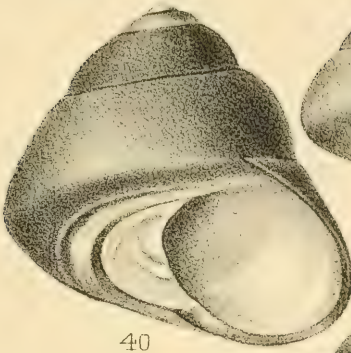
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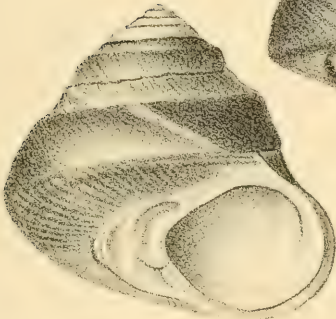
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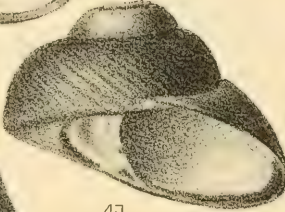
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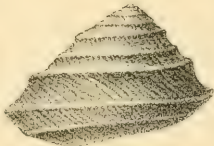
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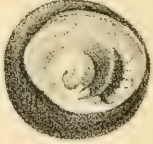
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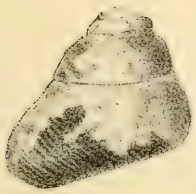
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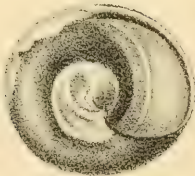
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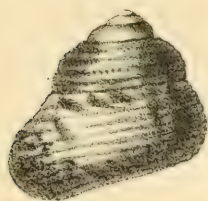
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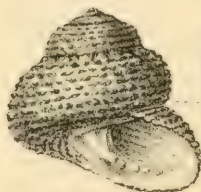
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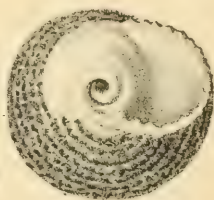
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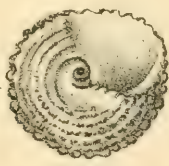
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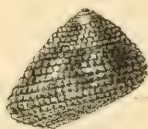
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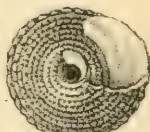
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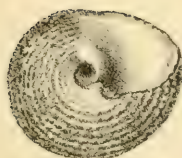
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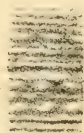
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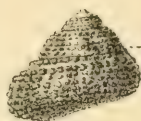
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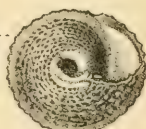
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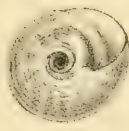
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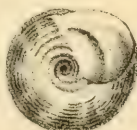
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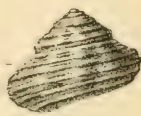
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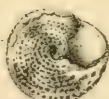
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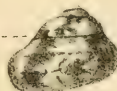
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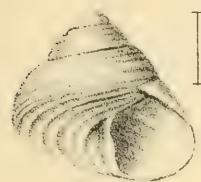
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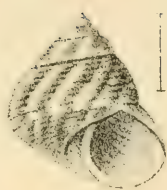
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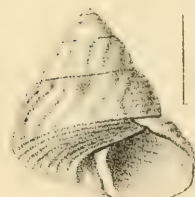
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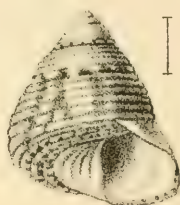
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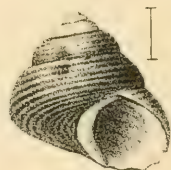
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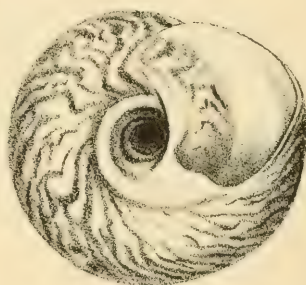
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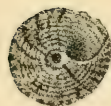
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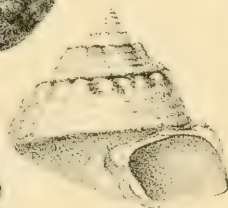
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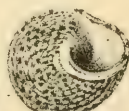
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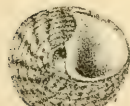
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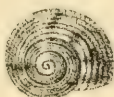
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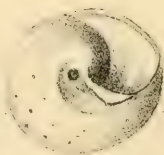
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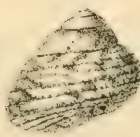
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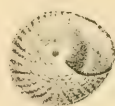
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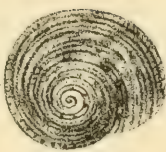
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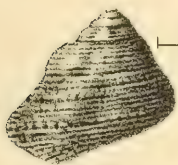
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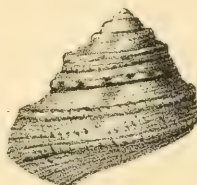
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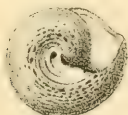
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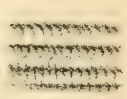
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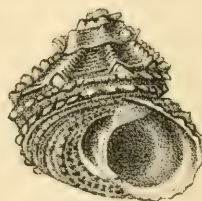
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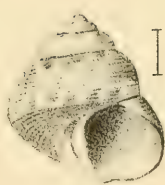
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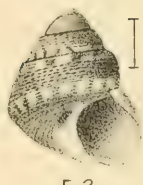
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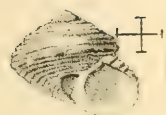
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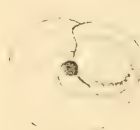
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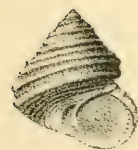
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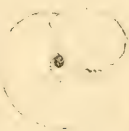
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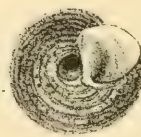
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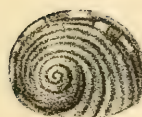
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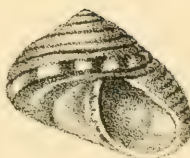
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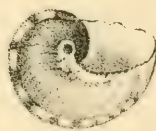
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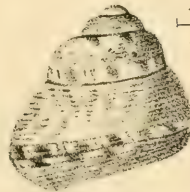
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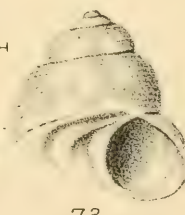
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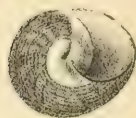
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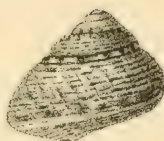
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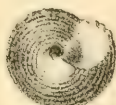
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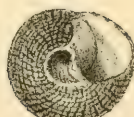
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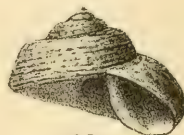
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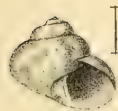
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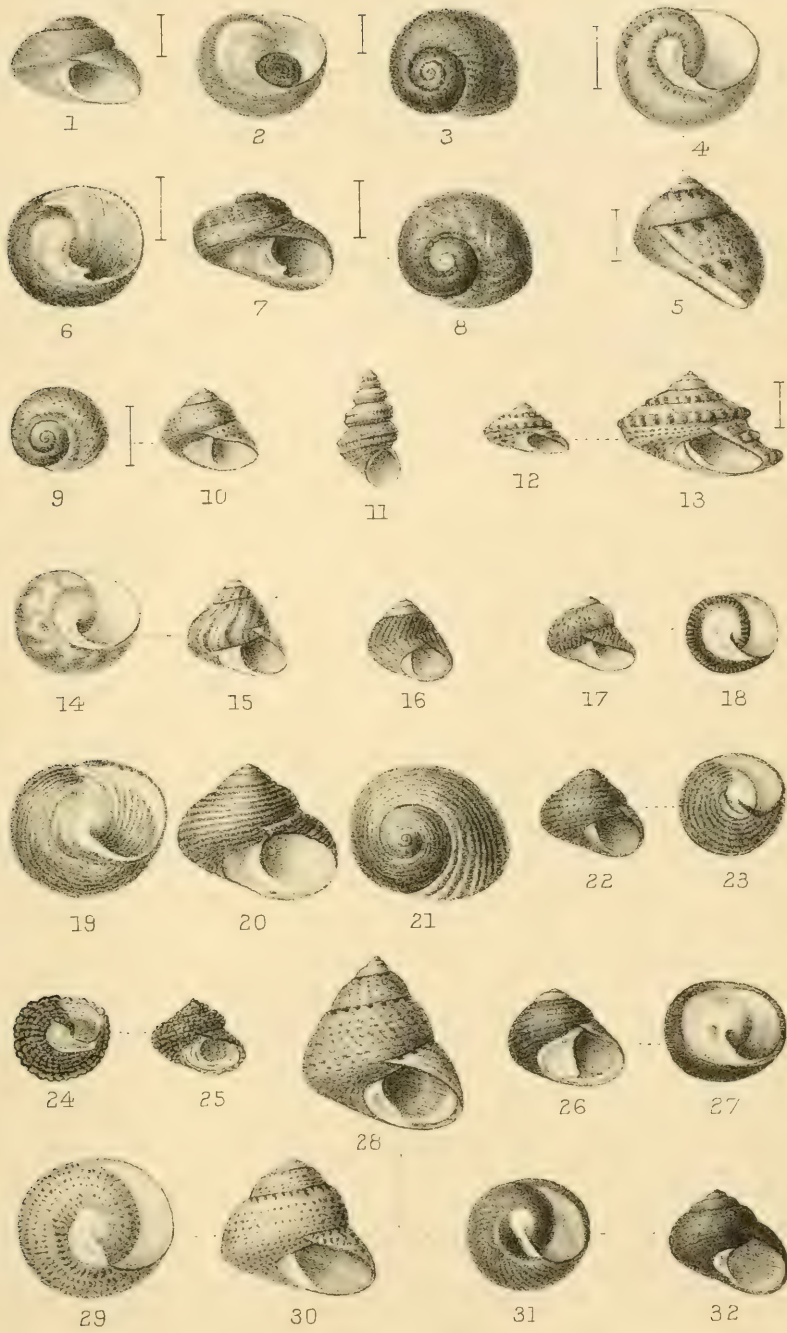


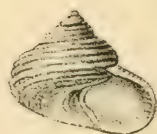
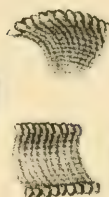
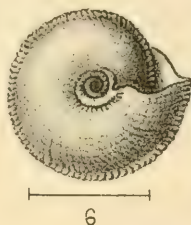
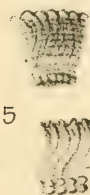
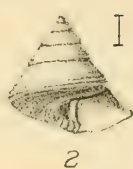
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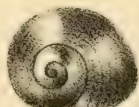
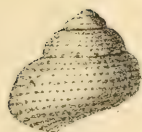
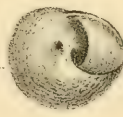
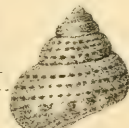
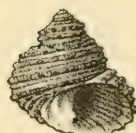
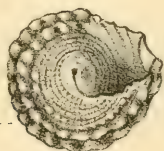


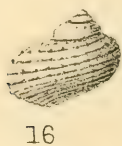
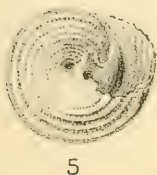
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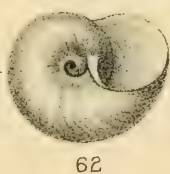
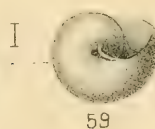


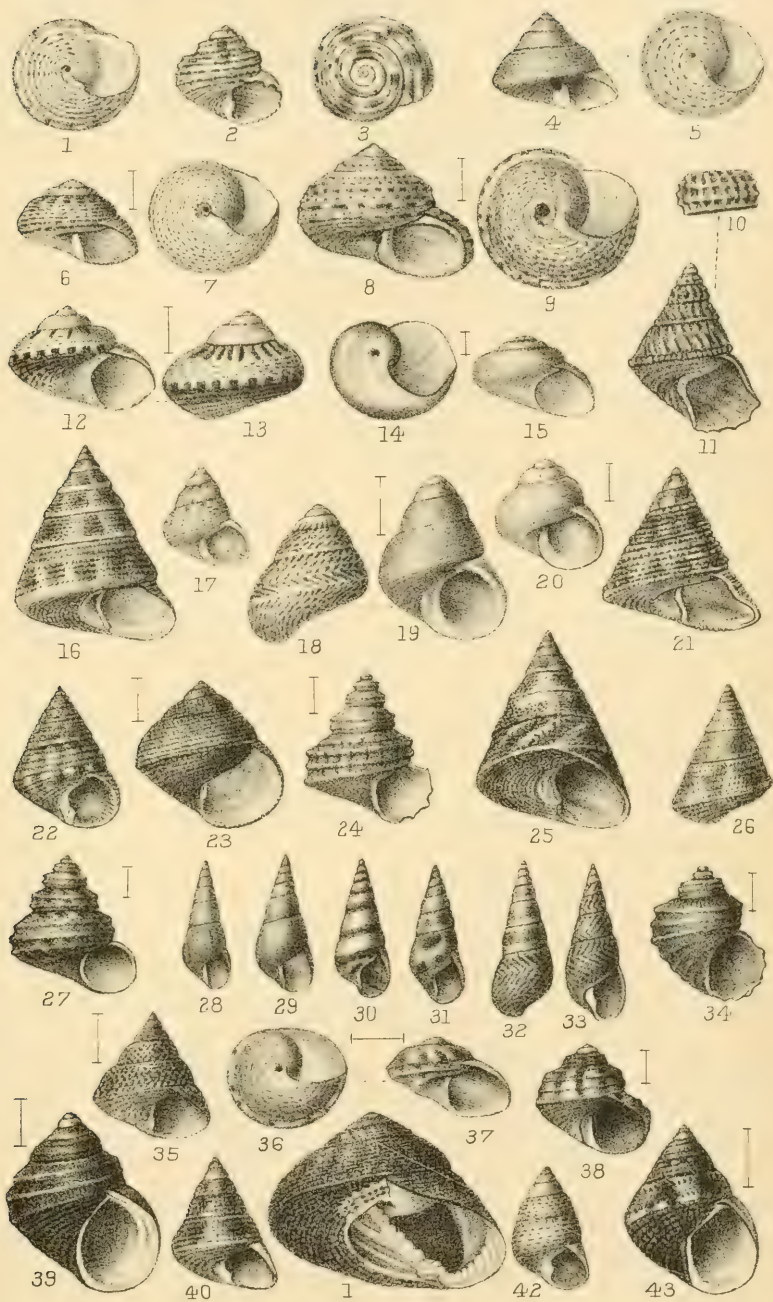


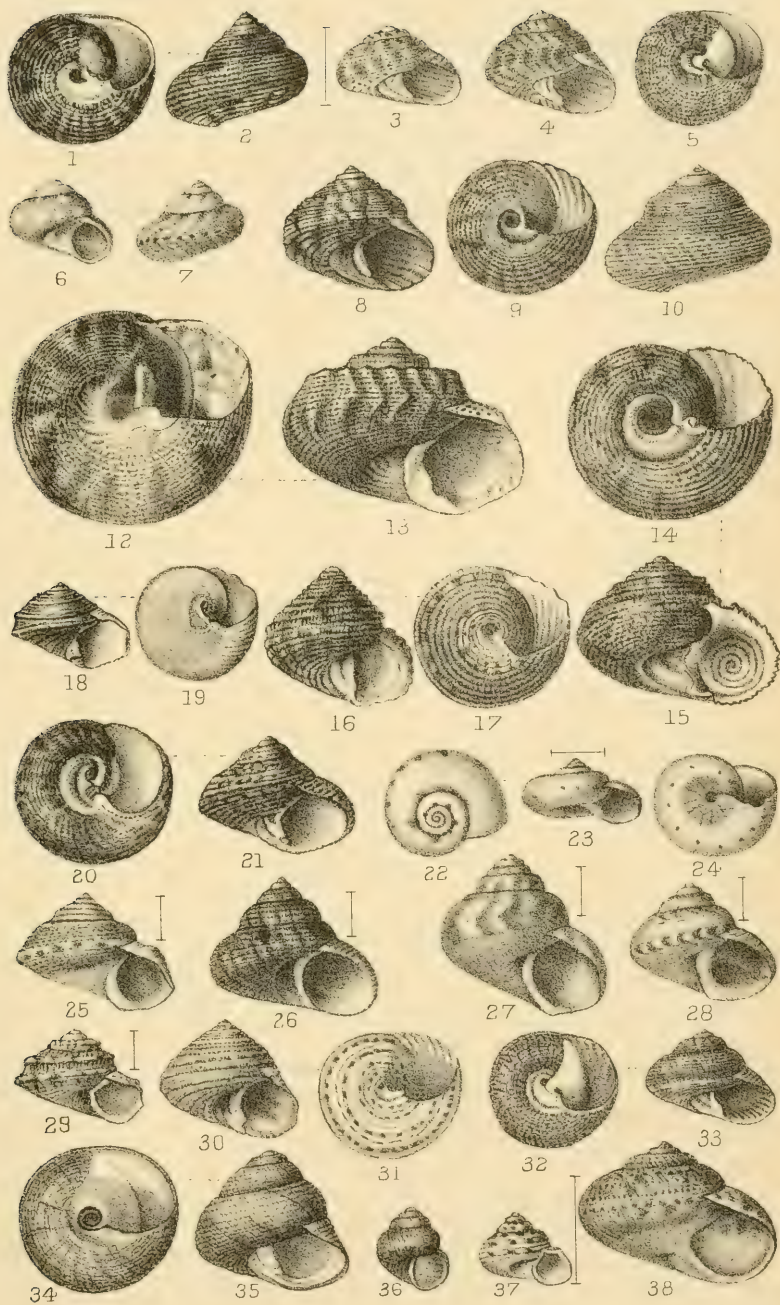


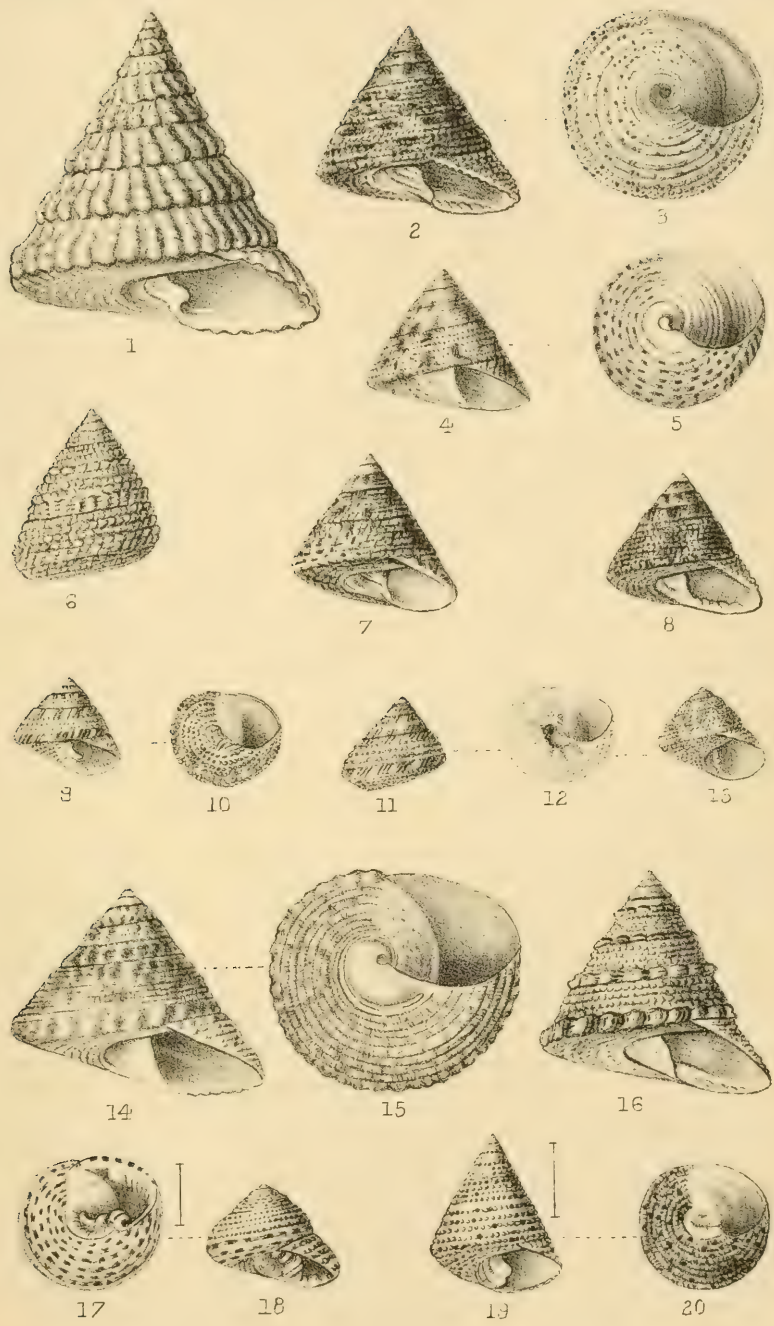


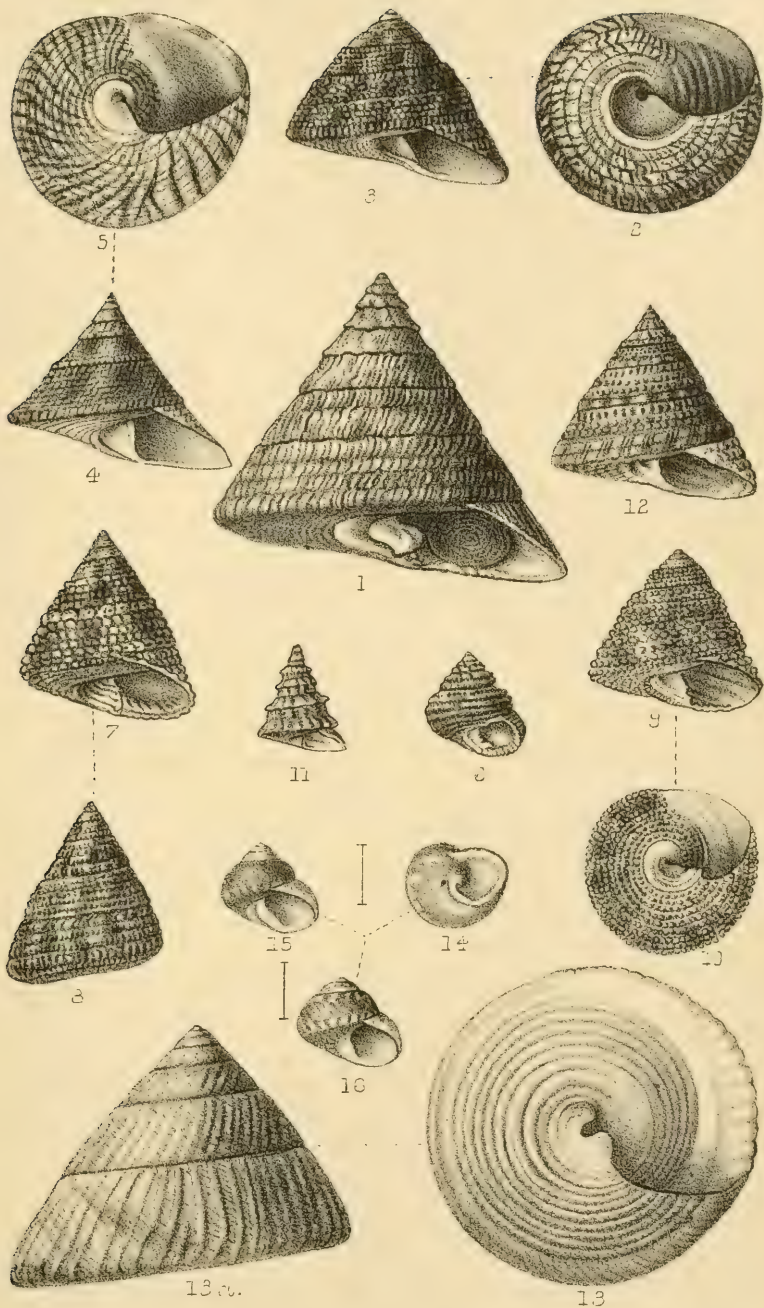










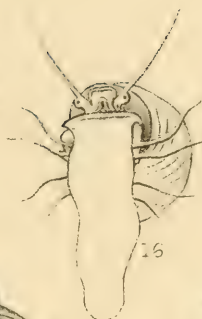




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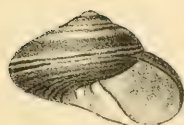
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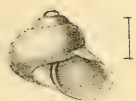
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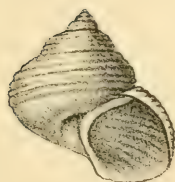
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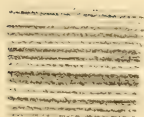
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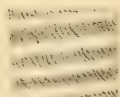
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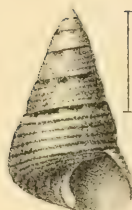
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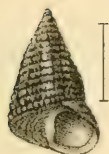
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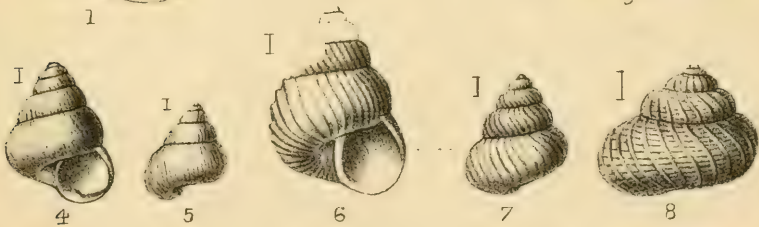
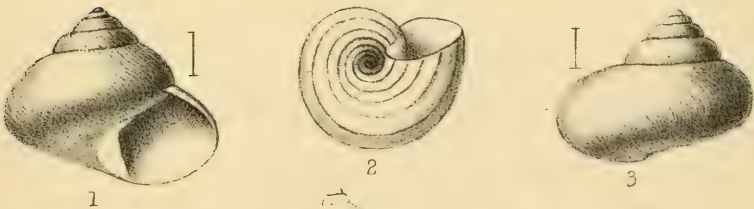
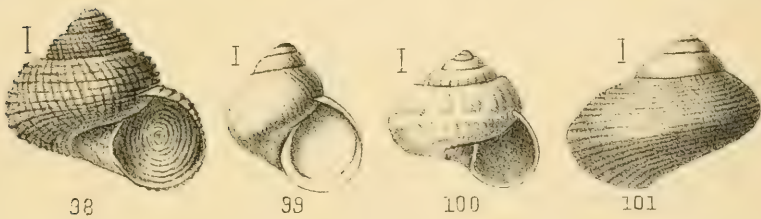
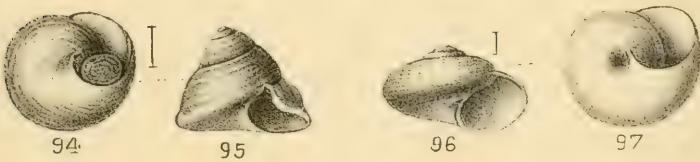
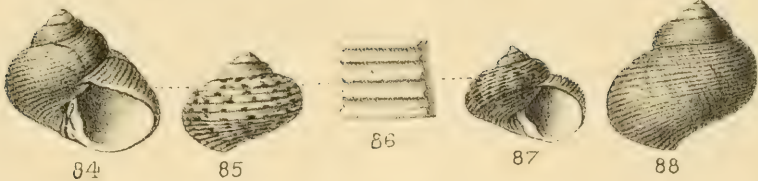
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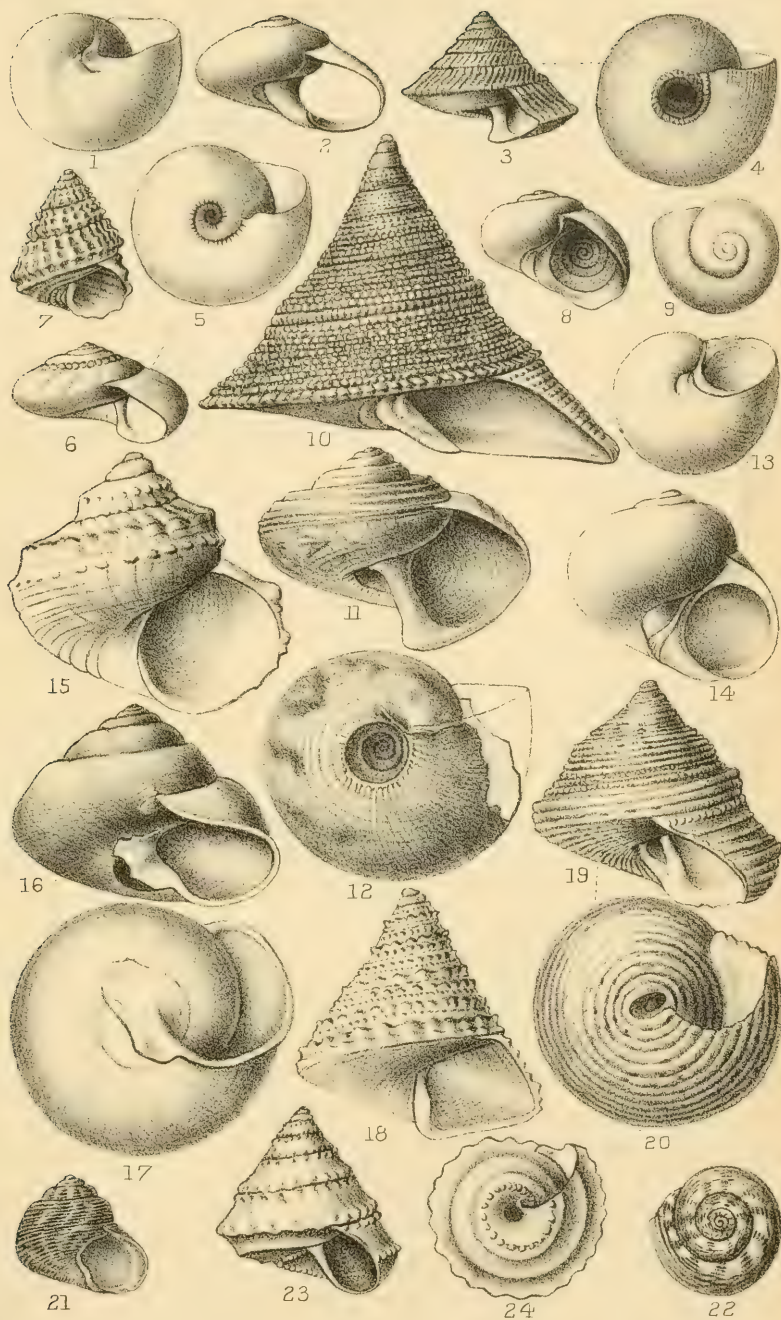


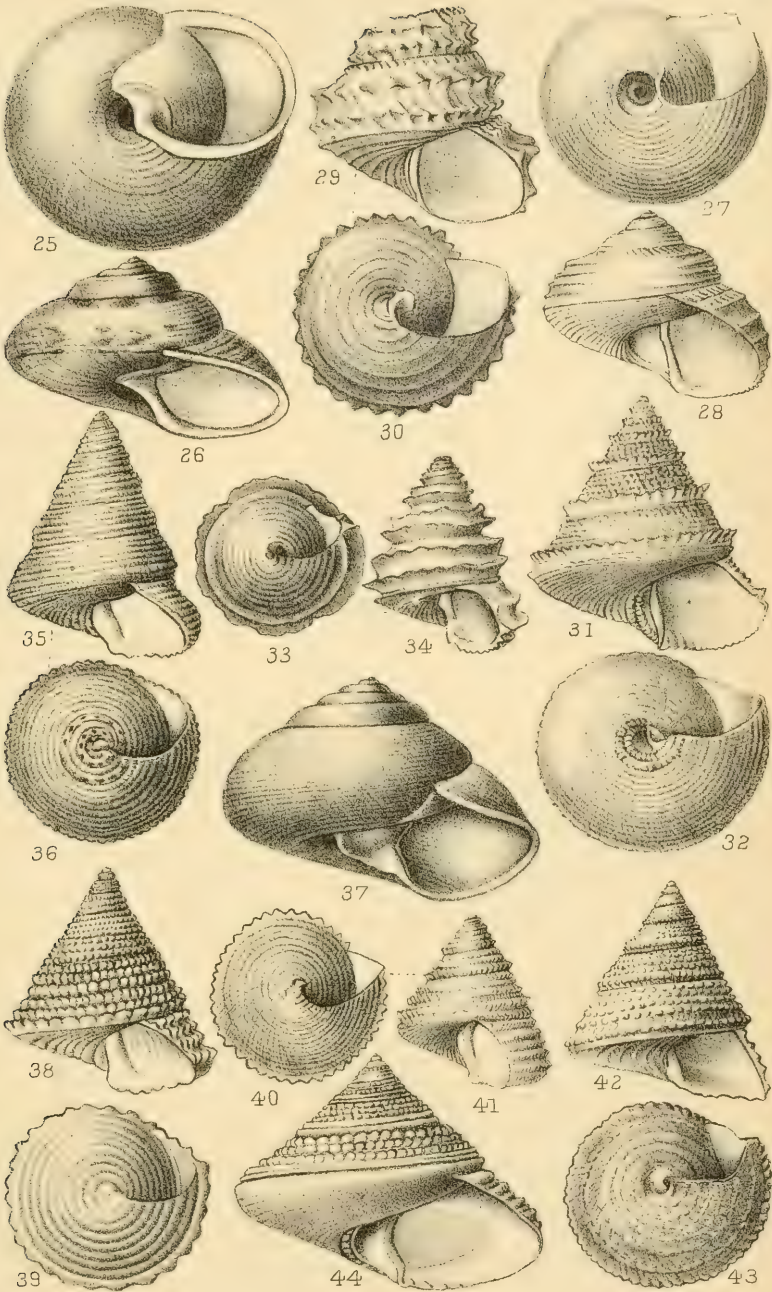
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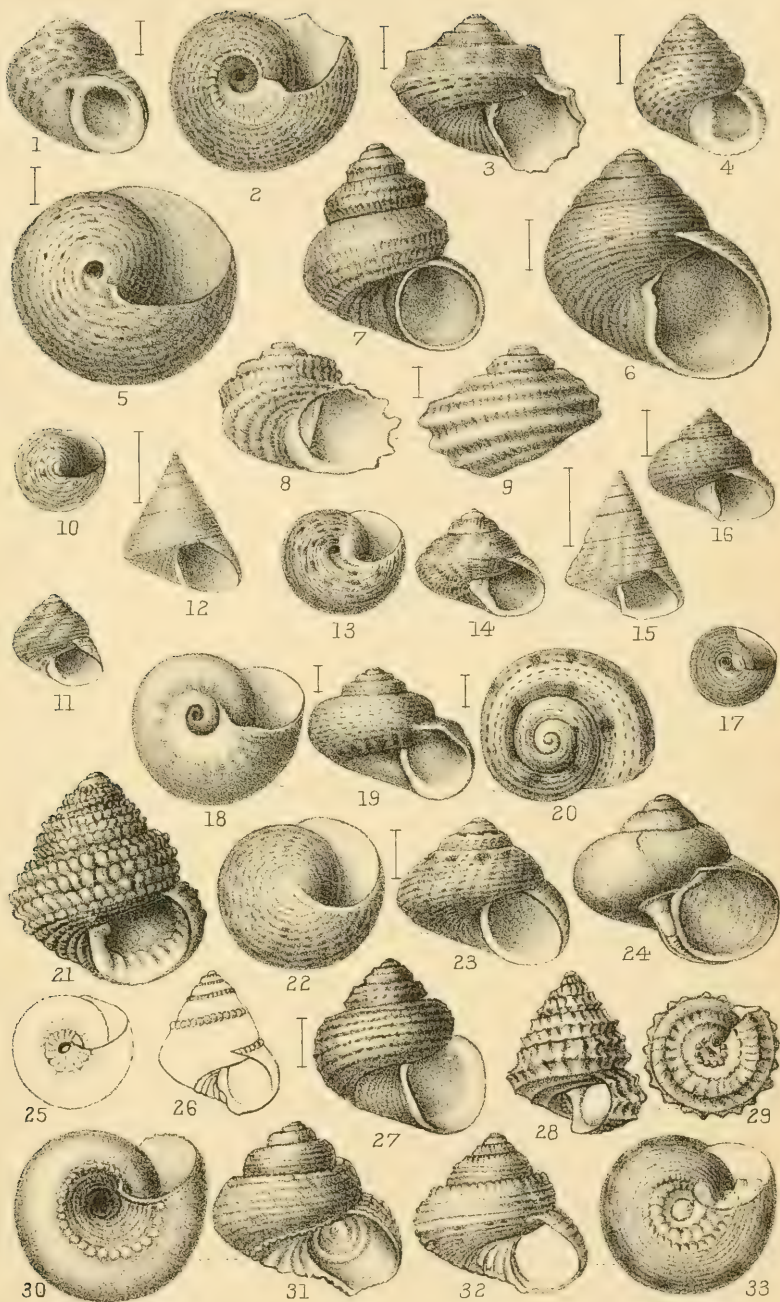
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NOTICE!

Plates 52 to 56, illustrating the

STOMATELLIDÆ, Etc.,

have been transferred to the next volume on account of the large size of the present one.

